SPACE WATCH

By Ray Darskan

FOLLOWING the astonishing spate of UFO sightings, the government has set up a special agency to investigate the possibility that an alien invasion is already taking place.

The new agency, which is to be stationed at a top secret base in Potters Bar, Hertfordshire, will be codenamed Space Watch and its charter is currently being drafted out by Whitehall.

The "alien" craft photographed by Gladys Shane above the Houses of Parliament. See story on left.

Informed sources tell me that among the special powers it is likely to be able to exercise, include:
● Stop and search procedures on any craft suspected of harbouring alien life.
● Close monitoring of unusually active radio wavebands with a special reference to the CB channels, where many people already claim to have overheard "alien conversation rituals".
● Direct access to the radio telescope network and its search for the regular pulses which could indicate signs of intelligent life in the UK — Willesden has already come in for close attention.
● And finally — and most controversially — the power to interrogate individuals who sight UFOs or claim any kind of "close encounter" with extra-terrestrial life. They have already had 76-year-old Gloucestershire grandmother Gladys (Ma) Shane (whose now famous photograph of a flying saucer over London is pictured right) closeted away in Potters Bar for over six days.

And we do know that a *Sinclair Spectrum* microcomputer has been pressed into service to assimilate information on sightings.

Naturally the Government finds it difficult to admit the existence of agencies like Space Watch.

Foreign Body Office spokesman, Sir Geoffrey Robertson, confessed as much yesterday.

He denied that Space Watch exists in current Government thinking and said: "It only takes on person to make claims about a secret government agency and everyone starts seeing them."

On being assured that a Government White Paper on Space Watch had already been published, Sir Geoffrey said.

"This is exactly the sort of mass hysteria I just described."

And asked to comment on the recent *Sun* story: "Ma Shane's in Potters Bar," he confirmed that, "She is helping us look into developments on her photograph.

I asked Sir Geoffrey to comment on current rumours that he himself has some 37 eyes on small green stalks. He said that the number was greatly exaggerated and anyway, the stalks were more the sort of mid-blue found in Artefian sunsets.

Galaxian Colony II!

By Our Science Correspondent

A COLONY of creatures from another galaxy are approaching Earth in a warlike formation, according to a report in the science journal "Which Cosmos?"

The author of the report, "Professor" Francis Cover D'Ingham claims the aliens will reach Earth in early November and feels they may make their landing under cover of firework displays.

He says that other scientists have come up with the same evidence he has, but

have chosen to put forward different theories to explain it.

Says the professor: "Just because these aliens' spacecraft aren't as spectacular as those created in the films *Star Wars* or *Close Encounters*, science tends to laugh them off. But although their spaceship design is admittedly lousy, the danger they represent is very real".

He first hit the headlines in the '70s with claims that Galaxians were on their way to Earth.

The professor, who claims a doctorate in Alien Fauna, gained, he says, at the University of Extra-terrestrial life, has been written off by successive governments as "A complete and utter crank". But his beliefs gained new credence this year following his now validated prediction that Italy would win the World Cup.

He has done most of his work on an *Apple Computer* using AlienCalc software in a study of TV crisp and instant potato commercials.

NEWALIEN PANIC

in wild strawberry patch

By Tom Sancukes
Country Staff

A WILTSHIRE market gardener says he has killed an alien being in his wild strawberry patch.

Alfred Hickey made his claims to police after a struggle with the alien among his greenhouses and orchards just outside Swindon.

During the fight, Hickey says, the alien fell into a hole he had previously dug in an area of his allotments overrun by wild strawberries. He hit the creature over its "red squishy head" with a shovel before burying it in the ground.

But when armed police dug into the ground where Hickey claims to have finished off his adversary, they only found strawberry remains — these are currently being analysed by forensic scientists.

Said Hickey: "I was out in the apple orchard inputting size readings onto my *Atari* microcomputer when this scarlet horror leapt at me from behind the compost heap.

"Grabbing the nearby shovel, I fought back chasing it into the greenhouse complex.

"I got in a couple of good slugs by the growbags, although it tried to do a runner, I eventually forced it

into this hole in the strawberry patch where I finished it off.

"It's caused no end of damage, I only hope this sort of thing is covered by my insurance. First those French Golden Delicious, now this!"

Hickey showed our reporter where the struggle had taken place and it would seem to have been a particularly violent one.

"I've already had some UFO protection league onto me about preserving alien fauna," said an unrepentant Hickey. "But what these people don't realise is that this was a me-or-it situation."

A police spokesman said: "We get this every week, last Thursday, it was a rabid gooseberry among his tomato pots."

Hungarian Squares Puzzle

By Ivor Storey
In Budapest

THE INCREDIBLE sequence of disappearances from Eastern Bloc countries has been credited to a "Bermuda Triangle" effect.

Over 27 dissident hikers who have gone missing under mysterious circumstances in the past six months are now believed to have entered areas where the Hungarian Squares phenomenon exists.

Apparently only right-thinking supporters of Soviet ideals can pass through these areas safely, says the report, which is based on data put together by a *Texas Instruments 99/4a* microcomputer.

Watch this space

In September we proudly boasted that this was to be the issue which put a capital "G" in *Computer & Video Games.*

An optimistic prophecy considering my ineptitude with a typewriter shift key, but there they are and we hope you like them.

Kate Clements' Space Watch gives a whole new look to Alien Invasion games and may revolutionise Mastermind-type code games too. But if making friends with the aliens smacks too much of pacifism then Kamikaze and Sharp Defender should make amends.

Brick Blaster gets this month's Government Health Warning: this game is addictive and may damage your keyboard's health.

News & Reviews

Listings

Look out! Here come the Kamikaze aliens, dropping from the sky like little green hailstones. Catch them on page 44.

Features

You only have to look at the cinema screens to realise that Fantasy rules OK. And in computer terms, this fascination with things escapist surfaces in adventure games, role playing aids like computerised dungeons and computer moderated gaming.

Next month, we give you some guidelines to setting up your own fantasy world on computer. We are also taking a longer look at computerised puzzling with some for you to solve.

Among the games listings are: Four-A-Side Soccer, Uranium Ore, The Croydon Blag* and a lot more besides.

*For those who aren't keen Sweeney and Minder fans a "Blag" is criminal terminology for a robbery.

And there was my copy — all covered in garlic

GARLIC PONG!

SOFTWARE GIANTS CLASH

There is a storm brewing in the games software industry which could change the way you buy your discs and cassettes.

While C&VG does not usually involve itself in industry news or comment, this was one story we thought you should be told about.

The issue is software copyright and the adversaries preparing for legal battle are industry giants Atari and Commodore. The battleground for this test case is Pacman and the key question will be: Can you copyright an idea?

The background to this case involves Liverpool-based software house, Bug Byte who first brought Atari's software protection policy to everybody's notice when they felt forced to withdraw the Vic-20 cassette Vicmen which Atari had claimed was too similar to their licensed Pacman game.

Bug Byte produced a press release which claimed they did not feel they were infringing copyright but did not have the resources to fight Atari and its massive parent, the Warner Brothers Corporation.

Commodore does have the resources and when Atari threatened to use the large U.S. microcomputer company over its Vic-20 cartridge Jelly Monsters the lawyers were called in.

There is no software copyright law in Britain at the moment although there is in the U.S. and both the computer industry and the Government feels that software

In Transylvania you cannot always make it to the newsagents on the right day. Last 16th of the month, I couldn't get out 'till late and my newsagent had put a cross on his door. Well there hadn't been any plagues around (I talk to rats, I know these things) so I guessed he must be keeping my copy of Computer & Video Games.

Sure enough when I flew in the window, I saw my copy all covered in garlic — and it had Haunted House in it too! That's what I get for playing with my VIC all night, instead of terrorising the local peasants.

Anyway I had a little word just under my newsagent's ear and now we get on fine.

Have a word with your newsagent — fill in the form.

copyright is necessary and have set up committees to look into the best way to set out the laws. This test case may now save them trouble.

The essence of Atari's case is that they hope to protect the innovative games designer and to ensure a higher quality of games software.

Arguments — sorry discussions — with writers from several software companies show that feelings run high on this subject and not all games writers want to be protected.

Atari usually take the part of the "Indians" in these discussions as a large corporation flexing its legal muscles.

Atari did not invent Pacman. The name Pac comes from the Japanese Pacu — meaning to eat — which shows its true origins. In the U.S. Pacman was the property of Bally Midway who produce the "official" arcade machines.

Atari bought the rights (licence) to put the Pacman name on the games cartridge for its TV games

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centre console — a name you can copyright over here — so other companies played safe by using names like: Super Glooper, Snapper, Vicmen and Jelly Monsters.

Atari bought its way into that success, others programmed their way into it. If Atari proves its case then games designers with innovative ideas will clean-up.

On the not so positive side, it may mean that some popular games may never find their way onto your type of home computer.

My own feelings are that the software copyright tangle does need sorting out over here. And while Atari may be fighting the right battle to sort out that mess, they have chosen the wrong battleground.

The Atari VCS Pacman is a very different game from the one which everyone has been plagiarising.

As comment pieces go this is probably a little sit-on-the-fence-ish but I am reserving my opinions until Atari have had a chance to defend their decision to me.

Please drop us a line at: Computer and Video Games, EMAP, Durrant House, 8 Herbal Hill, London EC1R 5JB.

EXCELLENT ENGINEER!

Dear Sir,
I am the proud owner of an Atari 400 computer, and buy your magazine every month. The Engineer listing in the April issue proved to be a huge success with everyone who played it. The listing itself was easily keyed in, and error-free. Thank you to the writers and also to you for publishing such an excellent game.

I would like to expand my 400 to 32K, and could I ask you which (if any) Ramcard Ingersoll and Atari approve of. Secondly, could you tell me which programs you shall be publishing for Atari in forthcoming issues. Keep up the excellent magazine, and don't forget Atari.

David Mills
Rochdale
Lancashire

Editor's reply: Officially the machine was only intended to be expandable to 16K. However, Calisto Computers of 119 John Bright Street, Birmingham, B1 1BE produce and fit a board. For approximately £100 which will take your Atari 400 up to 32K.

FEATHERED FRIENDS

Dear Sir,
Just as I was beginning to despair of finding a regular microcomputer magazine which properly acknowledged the existence of the BBC micro, I wandered into our local newsagents and found your first issue of the OWL supplement. Of course I instantly pounced upon it and placed a permanent order for your magazine.

Having had my BBC Model A delivered only a few weeks ago and having had very little Basic experience before that, although we do

have an ancient Pet at the office, I regret that I cannot yet think in terms of making a contribution to OWL.

In the meantime may I suggest that in the near future it would be useful to a lot of people (like me) if the article could include some plain language explanations of some of the more obscure keywords in BBC Basic and their equivalents in other Basic dialects.

For example I get the impression that one uses one of the VDU commands in BBC instead of PEEK and POKE and although I'm presently still researching I'm not quite sure of some of the relationships.

Richard A Bates,
Exmouth,
Devon.

A WIZARD ADVENTURE

Dear Sir,
Would you oblige us by pointing out to your readers an error in the article by Keith Campbell headed Rooms at the Top in the March 1982 edition of your magazine.

Wizard's Mountain was not written by Jeremy Zorwold. It was written by my colleague Nick Spicer some two years ago for the Apple II when he was working for the Software House as a software consultant. The original version of the program which he wrote did not contain the bug which Keith Campbell mentions in his review. Who would you try and compute the

log of zero for a watch — only somebody who was copying the program and did not understand even how the program was intended to function.

Having said all this we feel that Wizard's Mountain is now rather "old hat" and feel that you may be interested in the hi-res 21 colour adventure for the Apple II which is currently under development.
Dick Williams,
South Croydon,
Surrey.

PRESTEL AND THE VIC

Dear Sir,
My VIC-20 and I have been very interested in your articles about Prestel. I already have a Beebox 40 Prestel graphics adaptor (e.g. 40 columns etc.) So what do I do now and how much will it cost?

Another thing which bothers me is, are the Telesoftware programs in Basic and if so what sort of Basic?

I don't see how a person with a Tandy using Prestel can use the same programs as a Commodore using a Prestel. Do you have to alter the programs for your machine?
Brett McBain,
Wisborough Green,
West Sussex.

Editor's reply: You're at least halfway there with the Beebox adaptor.

Your next need is some Prestel software and a box that will allow you to connect to the telephone.

A number of people are working on systems to do just this.

You could try and see if one of the Tantel Prestel adaptors can be connected to your system. The cost is about £150-£200.

Telesoftware is machine specific — so you would only be able to download VIC software.

SOLUTIONS TO THE ZX . . .

Dear Sir,
In reply to D. McRiner of Shetland's letter, emphasising how, after a certain time, the unexpanded ZX81 won't EDIT.

I find that if the line to be EDITED is first LISTED, a following EDIT statement will carry out this function. For example if the line 570 is to be EDITED, key in LIST 570, after entering this enter EDIT and the command will be carried out.
Tim Hammonds,
Barnsley,
South Yorkshire

THE WISE OLD OWL?

Dear Sir,
Thank you for the very fair and perceptive review you gave my book Let Your BBC Micro Teach You To Program in the Owl in September.

However, I would like to correct one slight inaccuracy. The price of the book is not as printed in your review. It costs £6.45.
Tim Hartnell,
Earls Court Road,
London.

WE SLIPPED A DISC!

Dear Sir,
I would like to point out a simple mistake you made in your September issue about disc drives for the ZX81. You proclaimed that there are no disc drives available for the ZX81 and none are likely to be developed. But . . . Macronics is offering a drive and interface for the ZX81 for £160 which includes expansion motherboards and 2K Ram.
Kevan Thorn,
Dean Street,
Blackpool.

spectrum

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✂ See next page

TRANSLATING SPECTRUM

Dear Sir,
Please could you tell me how to translate the statement, "ON x GOTO . . ." into Spectrum Basic?

Simon Proctor,
Newport,
Gwent.

Editor's reply: ON x GOTO a . . . can be replaced with the following, rather awkward expression when using the Spectrum.

IF x = 1 THEN GOTO a
IF x = 2 THEN GOTO b
IF x = n THEN GOTO . . .

EINSTEIN A-GO-GO

Dear Sir,
I was intrigued by David Langford's article, entitled Einstein-a-Go-Go in the May edition, of your excellent magazine.

In fact it was so interesting, I felt compelled to write. There were two points not fully explored which I found mentally frustrating. So I was wondering if you could help out — without becoming too technical.

Which cosmic law dictates that faster than light (FTL) travel is impossible. Surely anything which travelled FTL in the universe would by its own speed, be invisible, and therefore very difficult to detect.

At the (velocity of light) C, a spaceship's mass would reach infinity. This may be so, yet if a spaceship could break the "light barrier", then would not all the laws be reversed at speeds in excess of C? Until finally, the spaceship became infinitely easy to propel. Also at such speeds what would the human eye see — if anything? Would light rays emitted from objects behind the spaceship, not be able to reach it? Thus giving the impression of a void, behind.

Vision would be cut by 50 per cent, only being able to see objects in front of the spaceship. Also the objects off to the side, will they be seen where they are, where they have been, or where they are going to be? So foreseeing the future!

The article said that it would take 10,000 years to travel across the galaxy. This seems to indicate that there is an edge to the galaxy. If this is so, what is beyond that edge? Perhaps another galaxy. But surely even galaxies must end at some discernible edge? What exists beyond that edge?

People once believed the earth was flat, this of course was not true. What shape is the galaxy or galaxies, or is man's brain not old enough to comprehend, only to question?

R. M. Cooper,
Halifax,
W. Yorkshire.

David Langford replies: To answer all the questions here would take a whole book! One such book is *The Science in Science Fiction* by Peter Nicholls, Brian Stableford and myself, to be published by Michael Joseph later this year. The Pelican *Relativity for the Layman* is also worth a look.

Einstein's well-tested Special Theory of Relativity predicts that we can never travel faster than light since our spaceship's mass would swell to infinity as we approached velocity c. We'd need infinite energy, infinite fuel, to accelerate to c let alone faster.

But there may possibly be particles called tachyons which "naturally" travel faster than light: the equations say the mass of a tachyon would be an *imaginary number*, implying either that they don't exist or that they can't in our universe. Worse, it's quite clear that it would take infinite energy to *slow* a tachyon to less than c: the 'light barrier' is impassable from both sides.

Mathematicians have even worked out that from the viewpoint of a tachyon creature, it's we who would seem to be travelling faster than light — we would seem inaccessible beyond the light barrier.

The general opinion is that something travelling FTL would exist (if at all) in a different "tachyon universe" beyond any hope of detection — both invisible to us and unable to

detect us. This is just as well, since most of present-day physics would fall apart if it were possible to outrace light and effectively peep into the future!

Finally, the cosmological questions. Our galaxy is a multiple spiral of stars around 10,000 lightyears across; light takes about 10,000 years to travel

across it and our slower-than-light spaceship must always take a little longer.

There are very many more galaxies, out to as far as our telescopes can see.

Now hold onto your hat: we believe there's a limit to the number of galaxies all right, but also that there's no edge. The *General Theory of Relativity* shows that space is curved through four dimensions in the way that the Earth's surface is curved through three. And, just as if you tried to reach the edge of the Earth, a long enough journey would take you right round the universe back to where you started.

THE WONDER OF GRAPHICS

Dear Sir,
Now that I have discovered your excellent magazine, I have developed an even greater interest in computers. I do not yet own one of my own, nor have I ever seen any of the more sophisticated games played on a home computer. So being naturally curious, I wonder if you wouldn't mind answering a couple of questions for me.

First of all, is it possible to

achieve the same degree of definition and speed of graphics on a home computer as on a good dedicated games machine such as the Atari, Philips or Intellivision?

I understand that the computer executes statements *one at a time* in numerical order (except for loops and jumps), so how is it possible to have dozens of objects all moving on the screen simultaneously, such as in Space Invaders or Galaxians?

Mr A A Birch,
Penrith,
Cumbria.

Editor's reply: Your home computer, with some decent software should be able to give you better definition and animation than a dedicated games machine. Most good games use machine code — which is about 10 times faster than programs written in Basic. Even when using Basic the speed of execution is fast enough to fool the eye!

BASIC WORDS OF WISDOM

Dear Sir,
I've had your magazine on order since the first issue, and think it is the most useful and interesting magazine out.

I'm writing to see if you can help me with the Peek and Poke locations on my computer. I have a TRS-80 Level II, and do not know many of the useful locations in the Basic Vectors on it.

I know about the keyboard scan locations, but can you recommend a book (other than TRS-80 Assembly Language Programming), which will have these locations in?

I am also doing machine language programming, so any of the Rom subroutines (such as the random number generator) locations would also be appreciated.

Andrew Wright,
Walsall,
West Midlands.

Editor's reply: A good book to look out for is 'More TRS-80 Basic' by Inman, Zamora and Albrecht. But the book you quoted, TRS-80 Assembly Language' by Howe is still the best introductory publication.

WORD OF THE KSIFFCHI

Ksiffchi are blue-furred marsupials, with a capitalist economy and a liking for alcohol. In other words, they are typical merchants.

This description comes courtesy of Marcus Rowland, the Ksiffchi's human mentor, who is currently guiding them through *C&VG*'s Starweb game.

By now, the game should have progressed sufficiently for these early comments on Ksiffchi tactics not to affect their aim to become the dominant force in the known galaxy.

Harken then to the words of the Ksiffchi as translated by Marcus . . .

Had I realised that you could play Starweb in England, I might have signed on years ago. Within a few weeks of winning my rule book, the first printouts arrived and confusion set in.

The printouts are meaningless without the rules, since each world has a coded situation report on population, resources, industries, military status, and a host of other information. It takes a lot of study to understand what's happening.

The competition game made things easier by pre-generating the first two turns, in which my race (now called KSIFF by Starweb's economical computer) expanded to 10 solar systems. In the third turn I started to write orders, deciding to expand my empire by sending fleets and probes to neighbouring systems while consolidating defences in the inner systems. I had a feeling this might soon be necessary.

In the fourth turn I encountered three other empires, and one of my worlds' defence forces ambushed another player's fleet. I don't know what is going to come of these encounters, but suspect that my defence force was a wise move.

As things stand, then, my position is rather interesting, since my score is relatively low and my empire is still underdeveloped.

I hope my moves this turn will rectify this situation, if not I'll try to go down fighting. The next few turns should be fairly decisive.

BRAINWARE ANSWERS

The solution to September's Nevera Crossword is printed above. But our September Mind Routines was more tricky than usual. The figure in the "H", "N" box should have been a "4" and not a "2". So we have extended the deadline by two further weeks on this. Entries by 1 October please.

More Brainware on the back page.

Winner of our August Mind Routines problem was Mr S. Templer, of Hayes, Middlesex. The crossword winner was Mr A. Doherty, of South Ascot, Berkshire.

WINNING DAYS

Our hoped-for Tron competition has had to be put back an issue because of space pressures — the publishing kind, that is.

But we hope to bring it to you next issue. November also sees the introduction of a competition so different that it is going to take us three issues to get it going.

A unique competition has come to our attention. Portsmouth-based Automata is producing its own version of the successful '*Masquerade*' puzzle. Pimania is the name of this adventure type game and Automata is putting up a prize valued at £6,000 for the first person to solve it. More details next month.

For the last word on competitions this issue, don't forget to let us know the best game we have published for your computer, since we launched.

Your votes could influence the Games Designer of the Year competition we have been running over the first 12 issues. A trip to Paris is at stake.

Confessions of a Bug

Perhaps you heard the editor grovelling on the phone this month . . .

"No I'm terribly sorry, it's a complete mystery to us . . . we had it working in the office just before we listed it . . . I think someone must have sat on the keyboard . . ."

YUK! Pathetic creature. Anyway the truth is that Mini Defender was a Screaming Foul-up special. We don't let him out much these days. But when we do . . .!

The offending lines are as follows:

```
40 LET B$(E) =C$
70 FOR E = 9 TO 2 STEP −C
200 NEXT B
```

One line which wasn't even graced with a line number was 80 which got mixed up with line 70. It starts at: PRINT AT D,D; and continues until the end of that line.

Martian Explorer (August) had more of T. Hitch's subtlety about it: line 4115 is a clear screen command and lines 4130 and 4140 contain a no. of graphics characters in inverted commas. Type in the following with the CTRL key depressed.
```
4130   ?  "FUEL  (8  spaces)  0
ZRXRXRXRXRXRXRXRXRXRXRZ 100"
4140 ? "SPEED −60 ARSRSRSRSRSR
SRS RSRSRSRSRA 60"
```

The central SRS should be printed in inverse video.

Several enquiries about Bomber last issue but we never touched it. If in difficulties check your "I's and "1"s.

16 COMPUTER & VIDEO GAMES

GAMES NEWS

AMERICANS SEND IN THE ALIENS

ZENITH

A dual sensation of flight and speed are the two key attractions in a new 3-D space game from America called Zenith.

Your mission: defend the new space city which is being constructed to house the inhabitants of the old galaxy. The aliens are attacking. Spiralling towards you in colourful geometric shapes.

You wrestle with the joystick in an attempt to keep your ship steady, and get the aliens in your gunsights — as the chequered ground sways to and fro, zooming past beneath you.

Zenith is one of a new series of games for the Apple II from the new American software house Gebbelli. The game is sold in this country by S.B.D. of Richmond at £21.50, together with the two other space games — Lazer Silk at £18.00 and Phaser Fire at £18.50.

Also new from S.B.D. this month is an insect war game called Fly Wars.

You are a spider crawling around the screen weaving a web, when suddenly you are attacked by a variety of pests. Fly Fighters can be easily trapped in your web.

Fly Wars runs on an Apple II in 48K and is available from S.B.D. at £17.95.

DEATH LURKS BENEATH THE WAVES

BBC POLARIS

A watery grave awaits you if you do not sink the enemy fleet that is advancing on your submarine at a rate of several knots.

"Up periscope" you scream at a trembling crewman, survey the horizon to spot two carriers complete with jets, depth charges, and anti-submarine helicopters.

The enemy ship is in range of your heat seeking missiles. You must give the command. It's kill or be killed. But can you do it?

All those hours spent at the simulator at naval school flash through your mind. You must have downed dozens of ships there every afternoon. But then that was just a game — this is the real thing. You pull yourself together and blurt out the vital command "fire".

BBC Polaris simulates the action of a sea battle with you as the captain of a Polaris submarine. The game runs on the model B, and costs £8.00 from Liverpool based Bug Byte.

Space Pirates is an Asteroids-type game in which you must protect your supply of space eggs from a relentless onslaught of meteors and alien ships. The game runs on the BBC model B and costs £8.00 from Bug Byte.

Budding chess expresses will welcome this latest addition to the Bug Byte range of games for the BBC computer. The game features a high resolution display of the board in full colour. It has a quick response on the lower skill levels, enables you to set up chess problems and retain games on tape. Chess costs £11.50 from the Liverpool firm.

WE TAKE MORE CARE OF YOU!

JUMBO

Pilot a Boeing 747 on a trans-Atlantic flight from Heathrow to Kennedy airport in New York without leaving your front room.

This flight simulation game is based as closely as possible on the actual controls of a Jumbo jet. You have a choice of six

INVITE THIS BANDIT INTO YOUR HOME

CASINO

Tired of walking to work when you have put your last 20p in the fruit machine down at your local?

Here is a way to kick the habit gradually with a fun version of the seaside pier favourite which offers you all the excitement of the real thing, but is a lot easier on your pocket — and your feet.

The game produces the three wheels on your screen which spin when you tap the appropriate key. The wheels stop one after the other and feature all the fruits, bells, and crowns of a normal one armed bandit.

Card sharks will also enjoy the pontoon game which is featured on the B side of this cassette.

Casino runs on a ZX81 and is available at £2.50 from A. Stoke, Harrogate, Yorkshire.

destinations in the UK and six in the States.

Molimerx say they are selling more copies of this game than of any other game they have ever sold.

The game runs on a TRS-80 or a Genie 1 or 3 and it costs £15 plus VAT from the Bexhill-on-Sea based firm.

Also new from Molimerx this month is an underwater sea battle game in which you captain a submarine and attempt to sink the enemy fleet which is bombarding you with depth charges from the ocean surface.

Seawolf runs on a TRS-80 or Genie 1 and 3 at £8.75 plus VAT.

War gamers will welcome a return to the eleventh century in a battle between the Saracens and the Crusaders also available from Molimerx at £11.75 plus VAT and runs on a TRS-80 or Genie 1 and 3.

ENCOUNTERS OF THE NASTY KIND

METEOR STORM

There are close encounters of the dangerous kind in this latest game for Sinclair's new baby.

Two different types of flying saucer and a bombardment of meteors are featured in the latest Asteroids type game for the Spectrum.

The game features thrust, fire, and hyperspace - moving left right on the keyboard thus recreating the principle features of the arcade version.

You also get a personalised score read out at the end of the game and a hold facility.

This enables you to make a cup of tea or answer the door, and then take up the game where you left off when you are ready to take on the aliens again.

The game also talks to you utilising the standard sound capabilities of the machine.

Meteor Storm is the latest game from Southampton based Quicksilva in the race to produce games for the Sinclair Spectrum. The game can be purchased from Quicksilva at £5.95 inclusive.

GAMES NEWS

JUST WHEN YOU THOUGHT IT WAS SAFE!

BBC INVADERS

Having colonised just about every microcomputer on the market those power mad Space Invaders are on the offensive again — this time gunning for the BBC model B.

These Invaders have learnt a thing or two from previous campaigns — namely the ability to fire missiles diagonally, as well as vertically. They can also move at six different speeds, and fire missiles at three different speeds, depending on the skill level you select.

Experienced Invader duallists will enjoy the fleet advancement feature on this game which cause the fleet to jump down the screen each time you go onto a new fleet.

The game gives you a comprehensive score and performance read out at the end of each game. You are told how many ships you hit, and their types. The number of shots fired, and your percentage success.

BBC Space Invaders is available from Leeds based Program Power at £6.95 plus VAT.

Also new from Program Power this month is Astro Navigator, a game in which you must navigate your space ship through a series of undulating caverns full of giant mice whose main aim in life is to stop your ship and eat its inhabitants.

Astro Navigator runs on the BBC model B and costs £4.95 plus VAT.

COMMANDING YOUR OWN BATTLE ZONE

TANK ATAK

Tank Atak puts you at the controls of a tank deep inside enemy territory.

From your screen mounted gunsight you can see enemy tanks, planes and flying saucers appearing from a range of hills in the distance. You must shoot these to score points but beware of their return gunfire which can destroy your tank in a split second.

Games players familiar with the arcade game Battlezone will welcome this addition to the software range available for the VIC-20. The game is a plug-in Rom cartridge and is available at £24.99 from Reading based Audiogenic.

THE LIGHT FANTASTIC

LIGHT PEN

Light pen games are becoming increasingly popular especially with younger users. An electronic pen enables you to locate and then move characters on the screen — for example chess pieces or the counters in the game Go.

A light pen for the VIC-20 is manufactured by Stack Computers of Merseyside. It costs £25.95 plus VAT and comes complete with an instruction manual and a free copy of the card guessing game Concentration.

Other games from Stack to be used with the light pen are Backgammon, Life, Solitaire, Draughts, Othello, Go and Ludo. These family favourites all come on cassette for the VIC-20 and cost £5.00 each.

SOLVE THE SECRET OF THE SPHINX

SPHINX ADVENTURE

Sphinx Adventure takes place in ancient Egypt against a back drop of pyramids, mummies and priceless treasure.

This text only adventure is a long drawn out test of your powers of reason and perseverance. You must collect treasure and bring it to the Sphinx — but watch out for the Trolls and Goblins who by some evil magic have been brought to ancient Egypt to fleece you of your treasure.

Sphinx Adventure runs on the BBC model B and is available from Cambridge based Acornsoft at £8.65 plus VAT.

Also new from Acornsoft this month is a four game pack for the BBC model B. Arcade Action features four popular arcade games — Invaders, Breakout, Dodgems and Snake. The cassette is available at £10 plus VAT.

MEET THE HAPPY EATER

THE GLUTTON, MOON LANDER

Those greedy electronic termites of the arcades are at it again. This time they have munched their way into the Sharp MZ-80K in a new Pacman type game called — appropriately enough — Glutton.

The Glutton is guided through the maze using four keys which move it up, down, left, or right.

The Glutton's aim is to gobble up all the dots in the maze and then start eating his way through the next one.

This new screen will appear as soon as he has eaten all the dots.

Just as in the arcade version, the ghostly quartet of creatures Inky, Blinky, Pinky and Clyde are hot on your little Glutton's tail. They are anxious to eat him as he is to eat those dots.

Also new for the MZ-80K is a space game called Moon Lander.

This game is based on the time-honoured Lander tradition. You have to land a space ship on a barren and rocky planet before you run out of fuel and crash. Glutton and Moon Lander are available from Sharpsoft of London. Each cost £5.85 including VAT, postage and packing.

IF THE CLOUDHOPPERS, WASPS, SPIDERS, METEORS, OR SATELLITES DON'T BEAT YOU...

...RENAISSANCE WILL

CLOUDBURST
meteor run
Renaissance
Spiders of Mars
satellites and meteorites

5 More great VIC Cartridge games from Audiogenic

GAMES NEWS

SPACE AGE VERSION OF THE STING

SWARM

The ultimate science fiction horror theme comes to computer games.

A queen bee is an uninvited guest on board an Interstellar space shuttle. Near Kroton — the fifth moon of the planet Zarg, an alien energising gas enters the ship through a damaged retrorocket. The humanoids on board are shielded from the gas by their helmet purifiers — but not the bee.

You arrive on the scene as a queen bee the size of a Harrier jump jet appears at the top of your screen. She immediately starts laying her eggs in a long snaking cocoon moving right and left across the top of your screen. Armed only with a laser base you must shoot accurately and shoot fast before the superbees hatch out and swarm towards you.

Once they start swarming their giant wings become difficult to avoid as they rain down from above. You have three lives with

a bonus life for every 1000 points scored — points are awarded for the number of bees downed.

Swarm runs on the Acorn Atom in 12K and costs £4.95 plus VAT from Leeds based Program Power.

Also new from Program Power for the Acorn is a Dogfight game. The action takes place in the middle of the ocean — both planes operating from off aircraft carriers. The object of the game is to shoot down your opponent

before he shoots you.

There is also a Stock Car race game which offers you 16 different tracks to negotiate.

Astro Warrior is an Asteroids type game in which you have to shoot assorted aliens and travel to far flung fuel dumps to keep your craft moving.

Dogfight, Stock Car and Astro Warrior run in machine code for the Acorn Atom 12K and can be obtained from Leeds based Program Power at £4.95 plus VAT.

WATCH OUT, ALIENS ARE ABOUT!

3D DEFENDER

Seated in the cockpit of your Defender ship you'll witness alien attackers, meteors, and scintilating clouds flying head-on towards you.

The ground is also not far below and you must be careful not to crash into the hills.

Armed with photon torpedoes you will score 250 for each direct hit and 50 if you fly low enough to entice an alien to attack you. As the alien onslaught proceeds you must be cautious to keeping your shield strength — set initially at 10 and reduced by one each time you are hit by plasma or meteorites, and by two for a collision or crash landing.

Flying controls include a forward radar screen which shows you what to expect to find in view a few seconds hence. A proximity warning tells you about imminent alien craft.

This 3D Defender cassette is available from the Bath based firm J. K. Greye and runs on a Sinclair ZX81. It costs £4.95.

ALL THE FUN OF THE FAIR

SHOOTING ARCADE

All the fun of the fair ground on offer in Shooting Arcade one of three new games from America.

You move your gun with a joystick or using the keyboard and then take potshots at the stampeding elephants, waddling ducks, and jumping bunnies.

Bonus points are awarded for hitting smiling faces. But don't mistake a smile for a frown — for if you hit a frowning face you

bullets will turn to blanks.

Shooting Arcade has been imported by Hertfordshire-based Audio Video Offers for the Atari 400 and 800. The other two titles from the U.S., Pacific Coast Highway, and Clowns and Balloons are, like Shooting Arcade, available as either a 16K cassette or a 32 disc version; all games and formats costing £20.50 each, inclusive of VAT.

PIRATE WITH A VAST EVIL ARMY

WINGED AVENGER

The Winged Avenger has countless Drones and an Invasion Froce to send out to do battle with you before he is drawn into the fight himself.

The Drones attack relentlessly and their purpose is to soften you up for the more superior Invasion Force. The Invasion Force are the elite of the fleet — and they will fight on to the very end, often necessitating more than one direct hit.

The Assailants also attack in three waves and combine a tendency to fly direct at your missile base — Kamakazi style — with very heavy fire power.

You have limited energy to fire your laser, which is capable of rapid fire, and to power your base shield which will protect

you from flying debris and from those of your opponents who wish to die in a blaze of glory by crashing into your laser base.

If you survive these attacks the Winged Avenger must concede that you are a worthy opponent and will engage you himself.

He is armed with powerful Smart Lasers that lock onto your base and are guided for the kill.

Your only hope of vanquishing this seemingly unbeatable space pirate is to damage his central control and force him to withdraw.

Winged Avenger is based on the popular arcade game Phoenix and runs on a Sinclair Spectrum. The game is available from Luton based Work Force at £6.95 inclusive.

VIDEO SCREEN

Walt Disney Productions

BIZARRE HEALTH CUTS

MICRO SURGEON

You will finally be able to put that the Biology O-level to good use when Imagic launches its bizarre game Micro Surgeon over here.

The patient is critically ill and the game challenges you to undergo a *Fantastic Journey* type mission into the bloodstream to save him.

Inside the patient's body, you navigate your way through the bloodstream, out-manoeuvring white blood cells that attempt to destroy you as foreign matter.

Your mission is to remove a tumour from the brain, a blood clot from near the heart and nicotine deposits from the lungs. But you must work fast as the patient will die within an hour if the operation is not complete.

Micro Surgeon is one of five exciting releases planned around Christmas time by the U.S. company Imagic through its distributors over here, Adam Imports. These four run on the Mattel Intellivision and go alongside a range of seven Atari compatible cartridges.

Apart from Micro Surgeon there is a version of the popular arcade game Donkey Kong, where you have to scale the outside of a skyscraper to rescue the girl from the clutches of the giant gorilla who is threatening to throw her off.

Just to make things a little more difficult the gorilla also has an inexhaustible supply of boulders which he is tossing down at you. You have to dodge these or, if you're brave enough, squash

them to score bonus points. The player that gets to the top and rescues the girl in the quickest time is the winner.

Swords and Serpents places you in a maze-like dungeon where you have to do battle with Black Knights, dragons, gargoyles, and an army of enemy Knights.

You are befriended by a wizard who you take under your protection until he learns the spells that may help you both escape with the treasure that litters the dungeon.

Demon Attack is a fast and furious space attack game based on the popular arcade game Phoenix.

Atlantis — that mythical city under the sea is under attack from alien spacecraft.

Armed with a single laser gun you are charged with the task of resisting the alien onslaught.

WINGED WARRIORS

DEMON ATTACK

The demons are attacking the ice planet of Kybor.

Armed with a laser cannon you must defend the planet's freezing surface from the demon fire which is being showered down on you from the eerie creatures hovering above.

THE WORLD OF TRON

TRON GAMES

With Tron the movie playing to packed audiences across America and soon to open in the UK — TV games centre owners may soon be able to enjoy some action on their own television sets.

First in the field are Mattel with two Tron-based games for their Intellivision machine.

The games are based closely on the storyline of the latest Walt Disney production.

In Deadly Discs you do battle with a variety of computer controlled adversaries who chase you across a black grid. You are armed with an electronic frisbee — disc which you fling at your opponents — just as in the film. If you score a hit your enemies which disintegrate.

In Tron-Maze-A-Tron you must penetrate the Master Control Programme, again just as featured in the film script. Sark —

the evil overlord of the computer will attempt to thwart you, sending out adversaries of "the most grotesque kind".

Six other games for the Intellivision machine have now been in the shops since the Summer: Space Hawk, Lock n' Chase, Utopia, Frog Bog, Sub Hunt, and Night Stalker.

Worthy of a particular mention among these is Lock 'n' Chase — Intellivision's answer to Pacman.

The game seemed a little slow by comparison with Atari Pacman and the Intellivision direction disc makes steering more difficult than with a joystick but the lock feature more than makes up for this.

It enables you to lock off sections of the maze by placing a little red bar behind you in the maze to foil — just as your pursuers home in on you.

Points are scored each time you successfully blast a demon out of the sky.

You are also awarded an extra laser cannon for each wave of demons you manage to survive.

The value of the demons increases as you go onto the next wave — up to the 12th wave when Demons are worth 35 points, Split Demons 70, and diving demons 140. From this stage onwards the points remain the same.

The Demon Attack cartridge gives you ten games in all to choose from — some for one and

some for two players.

Games 1, 3, 5 and 7 pit you against progressively more difficult waves of demons.

The higher the game number — the faster and more skilful the demons become.

Games 2, 4, 6 and 8 are two player versions of the above — play alternating between both players. Tracer shots are also featured in the two player versions.

Demon Attack is manufactured by Imagic for the Atari VCS and will be in the shops in October.

RIBBIT, RIBBIT!
FROGGER

The trip to the breeding grounds is life and death to the hopping amphibians of Frogger.

A busy highway and a perilous river crossing stand in their way and they have only 30 seconds to reach the home bays.

Frogger is the second cartridge in the range of Atari compatible games from Parker Brothers to be available over

here and it is a very close copy of the arcade original.

Each frog must be guided through five crowded lanes of traffic, hopping between cars and lorries, travelling in different directions at varying speeds.

Then he arrives at the river bank and is faced by a raging torrent, carrying logs downstream while turtles swim up it.

By judging leaps between these he will arrive at his home bay.

But our aquatic leaper must take care not to spend too long on the blue, diving turtles which will dip below the surface and surrender him to the current. On the bright side he could rescue a lady frog from the logs and carry her home on his back.

Alligators drift between the logs and their jaws will snap shut on any frog careless enough to leap into them.

Points are scored for every frog safely home and bonuses for those who picked up a lady friend or found a tasty fly meal.

When all five frog bays are filled a set of new frogs come out to make the trip — only across more crowded roads and with fewer floating objects on the river. But watch out for snakes and alligators on the river banks in the later stages.

Palitoy markets the cartridge over here and it costs £29.50.

MAY THE FORCE BE WITH YOU
THE EMPIRE STRIKES BACK

Take the controls of a soaring snowspeeder to defend the rebel base on Hoth from Darth Vader's Imperial forces in this recreation of the fabulous battle from The Empire Strikes Back film.

The seemingly indestructible Walker Tanks prove formidable opponents as they plod inexorably closer to the rebels' reactor. Five Walkers, which resemble robot camels, approach the base in single file, spitting missiles from their heads and smart bombs from other parts of their anatomy.

It takes 48 hits to destroy a Walker but each series of eight hits weakens and slows it, producing a tell-tale colour change. All five must be despatched before any one of them reaches the reactor which is placed at the end of a radar strip displayed beneath the screen action.

There is just one chink in the Walkers' armour, bomb hatches which flash open on the body and a direct hit on one of these will result in instant destruction.

The snowspeeders are vulnerable in comparison, any hit will badly damage them and a

wise pilot puts down for repair at one of the many recovery pits before risking further punishment. Smart bombs are more dangerous than ordinary missiles. They appear with a buzz and chase the snowspeeder around the screen as he tries desperately to outmanoeuvre it or blow it up. They may also destroy the craft with just one hit.

Of course you couldn't have a Star Wars game without including the Force — that almost magical quality which enhances human performance — and if you can keep any snowspeeder alive for more than two minutes, the Force is with you for 20 seconds.

During those seconds the snowspeeder is all-powerful and cannot be destroyed, make the most of this period to get in some telling hits.

The Empire Strikes Back is the first of the Parker Brothers range of cartridges to be released over here. We have already received good reports of its reception in the U.S. and it is being distributed over here by company, Palitoy. As we mentioned last

month this range of Atari-compatible cartridges is going to expand rapidly and some exciting titles are promised.

Empire Strikes Back should be in the shops now and costs £29.50.

NOW-SOUND AND VISION
SPACE SPARTANS

Space Spartans and B17 Bomber feature the new Intellivoice speech reproduction system which reproduces voices fairly realistically.

The Intellivoice Voice Synthesis Module plugs into the cartridge slot on the Master Component and then the special Intellivoice cartridges plug into this. The speech box costs £89.95 from Intellivision stockists.

The battle computer — which is the speaking part of the game Space Spartans — tells you how you are progressing and warns of any imminent aliens.

Of the new games available for the Intellivision machine Star Strike was the one that stood out from all the others at a recent Mattell toy fair.

It's 3-D graphics are both colourful and vivid. Alien ships buzz around you as the planet earth moves slowly across the screen — within range of the alien missiles.

Intellivision cartridges are available from good toy shops at between £19 and £24 although the new Intellivoice cartridges are slightly dearer at £29.95.

Illustrations: Jon Davis

Probably the fastest microcomputer in the universe

the JUPITER ACE only £89.95.

All inclusive Price

For £89.95 you receive your Jupiter Ace, a mains adaptor, all the leads needed to connect to most cassette recorders and T.V.s (colour or black and white), a software catalogue and a manual.

The manual is a complete introduction to the world of personal computing and a course in FORTH programming on the Ace.

Even if you are a complete newcomer to computers, the manual will guide you step by step from first principles to confident programming.

The price includes postage packing and V.A.T.

Key Features

- Revolutionary microcomputer language FORTH.
- Full-size moving-key keyboard.
- User-defined high-resolution graphics.
- Programmable sound generator.
- Floating point arithmetic.
- Fast cassette interface.
- Upper and lower case ascii character set.
- 24 x 32 character flicker-free display.

The Jupiter Ace uses FORTH

The Ace is set apart from all other personal computers on the market by its use of a revolutionary language called 'FORTH'. Some computer languages are easy for humans to understand, others are easy for computers; FORTH is most unusual in being both. Its underlying principles are so simple that it takes even a newcomer to computers only a few minutes to learn how to do calculations on the Ace, yet the very same principles are powerful enough to allow you to invent your own extension to the language itself.

At the same time, the memory-saving coded form used to store your programs inside the Ace allows it to obey them very fast — typically in less than a tenth of the time it would take to do the same thing using a different language. Amongst other things, this makes the Ace ideal for "games".

FORTH's unique combination of speed, versatility and ease of programming has already made it a prime choice for professional applications as diverse as pub games and radio telescopes, and gained it an enthusiastic user group. Now the Jupiter Ace can bring this addictive language into your own home.

Designed by Jupiter Cantab

Leading computer Designers Richard Altwasser and Steven Vickers, who have a reputation for pushing technology forwards. After playing the major role in creating the ZX Spectrum they formed Jupiter Cantab to develop their latest brainchild the Jupiter Ace.

Technical Specification

Hardware

Processor/Memory
Z80A running at 3.25 MHz.
8K bytes ROM 3K bytes RAM.

Input
40 moving-key keyboard with auto-repeat on every key.

Output
Memory-mapped 32 x 24 character display with high resolution user graphics. Output to drive normal UHF TV set on channel 36.

Sound
Provided by internal loudspeaker.

Cassette
Load Save & Verify at 1500 baud, separate data storage.

Software, FORTH

Data Structures
Integer, Floating point and String data may be held as constants, variables or arrays with multiple dimensions and mixed data types.

Control Structures
IF-THEN-ELSE, DO-LOOP, BEGIN-WHILE-REPEAT, BEGIN-UNTIL, all may be mixed and nested to any depth.

Operators
Mathematical +, —, X, ÷.
Logical AND, OR, NOT, XOR.
Comparison <, >, =.

Program Editing
FORTH words may be listed, edited and redefined. Comments are preserved when words are compiled.

Order Form

The Jupiter Ace is available only by mail order. Please allow up to 28 days for delivery.

Send cheque or postal order with the form to:—
JUPITER CANTAB, 22 FOXHOLLOW, BAR HILL, CAMBRIDGE CB3 8EP

Please send me:—

☐ JUPITER ACE MICROCOMPUTER(S) @ £89.95.

Name. Mr/Mrs/Miss

Address

CVG

CHESS

CHEQUERED MATES . . .

The International Computer Chess Association (ICCA) was formed at the second world computer chess championship in Toronto in 1977 and has just celebrated its fifth anniversary. For its first quarter century of life, computer chess managed without any central organisation at all, events being run by eager volunteers distributed sparsely throughout the world.

By 1977 it was evident that a central organisation was needed to administer an activity which was already attracting much larger audiences than most human championships.

The founding members of the ICCA were simply the competitors in Toronto. Five years later the membership stands at over 500 including a former world champion, Mikhail Botvinnik, with branches in a number of countries.

It has organised a further world championship in Austria and sanctioned a number of other events. Most importantly, the existence of ICCA has given computer chess a respectability with the conventional chess world.

ICCA has just ratified a co-operation agreement with FIDE (the International Chess Federation) and has worked painstakingly for computers to be allowed to enter human tournaments, earn international gradings and even to be allowed to enter the human world championship cycle.

It is some indication of their success in raising the overall status of computer chess that there should now be serious debate about whether entering a computer in the world championship is reasonable — not long ago, it would have aroused nothing but laughter.

The ICCA Newsletter — published three times a year — is currently the best source of up-to-date information about computers and chess.

Membership costs 10 dollars (U.S.) per annum and the secretary is Ken Thompson, Bell Telephone Laboratories, Room 2C2423, Murray Hill, NJ 07974, USA.

The latest issue of the ICCA newsletter includes analysis of all the game of the 12th North American Championship, won as so often by Ken Thompson's Belle. Here is a strong win by Duchess against the Sicilian Defence, from the first round.

White: Duchess, Black: Awit
1. P-K4, P-QB4; 2. P-Q4. The Morra Gambit.

2. . . . P×P; 3. P-QB3, P×P; 4. N×P, N-QB3; 5. N-B3, P-Q3;

White has gained a lead in development at the cost of a Pacon. Although not often played at grandmaster level, White's opening can be a very strong weapon against ordinary mortals.

6. B-QB4, P-K3; 7. O-O, N-B3; 8. Q-K2, B-K2; 9. R-Q1

Black is now out of its 'book' and makes an immediate mistake (9. . . . P-K4 is necessary).

9. . . . O-O? 10. P-K5, N-K1; 11. P×P, N×P?

Another mistake, which loses a piece. Black had to play the unpalatable B-B3. Now Black's Knight is pinned against the Queen.
12. B-B4

White threatens to win the Knight by N-K4. Incredibly White is still 'in the book' at this point. After Black's next move, White begins to calculate his moves.

12. . . . N-N5; 13. P-QR3, N-QB3; 14. B×N? (14. N-K4 is better, winning a piece for nothing. Now Black can win another Pawn for it's piece).
14. . . . B×B; 15. N-K4, B×P ch; 16. N×B, Q×N; 17. Q-R5, B-Q2; 18. QR-B1. (18. N-N4 threatening R×B followed by N-B6 ch wins quickly. N-N4 would still win after Black's next move).
18. . . . QR-R1; 19. N-Q6, B-K1; (White's 19th move was a mistake, simplifying the position when he still has many attacking chances).
20. N×B, R×R ch; 21. R×R, R×N; 22. N-B3, Q-B2;

(Now 23. N-N5 threatens mate and 23. . . N-N5 wins the Pawn on K6, Black's KBP being pinned).
23. Q-R4, R-KR3· 24. Q-R2, Q×Q ch; 25. K×Q, R-QR3; 26. R×R ch; N×R; 27. K-N3, P-KN4? (weakening his Pawn structure for no reason).
28. N-Q4, P-KR4; 29. K-B3? (P-B4 would screw up the weakness of Black's Pawn structure).
29. . . . K-B1; 30. K-K4, P-N5; 31. K-B4, K-N2; 32. N-K5, P-R3; 33. K×P and Black resigned on move 48.

BY MAX BRAMER

PRESTEL

NEW PATHWAYS ...

Have you been through Prestel's GATEWAY yet? That's the latest development on the viewdata scene, and also brings Prestel a bit closer to the more familiar world of micro-computers. It is very much part of the current trend as Prestel starts to offer more to micro users, and as micro manufacturers start adding viewdata interfaces and facilities. Increasingly viewdata will provide a service to micro users.

What is GATEWAY, and how does it fit in? Basically, a GATEWAY is a standard concept — that of linking together different types and makes of computer. This is often far from easy, because different computers work in different ways. It is almost unheard of among micros — hardly any of them can be linked together, even ones from the same manufacturer.

The purpose of a GATEWAY is to set up standard rules and procedures to allow computers to talk to each other. This needs to be done at several levels, starting at the fundamental electrical level, and rising through more complex procedural and programming levels.

But once it is done, different computers can send and receive data and programs.

They often use the telephone system to do so — using a special new service called "packet switching" which means that instead of dialling up somebody — or some machine — you send the data off into the telephone system bundled up into the little electronic packets, and the system then directs the packets to their destinations — much like ordinary letters, except that it's all automatic, and at electronic speeds.

INTERACTIVE GAMES

In the last few months Prestel have set up their side of the GATEWAY, and a handful of other organisations have done their bit. First off the mark was Hatfield Polytechnic, with a GATEWAY into their educational database.

By Peter Linton

The second GATEWAY link was to Baric, who already have a range of games on Prestel. But via the GATEWAY link into Baric's own computer, it's been possible to open up a couple of proper "interactive" games, much more like proper micro games. One is Bulls and Cows also known as Mastermind in which you have to guess a four-digit number. You get some clues if you guess the right number, and or its correct position.

GATEWAY ACTS

On Prestel, a game like that would take thousands of pages to cover all the permutations. In the Baric version, it needs just one page, plus a clever program behind it. The reason why it's cleverer than a microcomputer version we'll look at in a moment.

The other interactive offering on Baric is a biorhythms calculator, showing in graphic form whether you are emotionally, physically and intellectually up or down — or just in the critical inbetween stage.

Other games are likely to appear via GATEWAY soon, as other organisations get their GATEWAY acts together — technically it is fairly complex. Because of the limitations of Prestel graphics and the capacity of telephone lines, they will never be as fast or powerful as the best micro or arcade games. But GATE-

WAY will make Prestel games better — and more fun.

There is an interesting technical aspect in programming such games that you might like to experiment with on your micro.

A GATEWAY game like Bulls and Cows has to be able to handle more than one user at a time — unlike a micro.

There might be 20 or more simultaneous users, all at different stages in the game. While some are thinking about their next guess, others are typing it in.

KEEPING TRACK ...

So the first problem is that the program cannot simply start at the beginning, and run through to the end. It has to keep track of every user, what his previous guess was, and which part or segment of the program he should go to next.

That's the fundamental difference between what's called "batch" computing, where you do one thing from start to finish, and "online" computing, where you are connected to a program that is always live, never stops, and takes a large and changing number of users through the program.

Not only that, but the computer may have up to 40 different programs, with dozens of different users all expecting the machine to produce the right answers — and fast.

BE DYNAMIC

How would you write a program that could keep track of different users, what stage they were at, and which program line they should GOTO next?

The answer obviously lies in the direction of a dynamically updated look-up table, which tells the computer where it's at.

It gets fairly complex, but it's a vital aspect of modern computing, and one of the important differences between a micro and a mainframe computer.

Still once you've cracked it you can start work on a GATEWAY into your own micro.

THE FANTASTIC FREAK

TIPS ON TEMPEST

Tempest as we know it today is a freak of design — the original game was intended to be a monster scenario — the cabinets being illustrated with hairy beasts.

Only just before the game was due to go on general release did the designers realise that the Atari video screen would not produce the required monster graphics.

A new format was hastily worked out, the cabinets re-painted, and one of the most popular video games of the moment hit the arcades.

Tempest graphics are surprisingly distinctive considering the rushed manner in which the final product was conceived.

The game features sixteen different electrical force fields — each inhabited by a series of colourful electrical enemy shorts. You are an open electrical circuit and your task is to electrocute the enemy in a highly charged force field.

Once you have destroyed the enemy in one pattern you are sucked through the centre of the screen and placed in a new electrical field with a new 3D pattern.

Your controls feature a control knob which is rather like the tuner on a transistor radio — it moves you at great speed around all the open lanes. It is your key to success in Tempest — and you must develop a feel for its sensitive reaction to touch.

The first button is fairly simple. You have an unlimited supply of ammunition so it is advisable to keep up a fairly constant barrage of fire. The Super Zapper must be used selectively as it can only be used twice in any one pattern. The first time you use it it will destroy all your enemies with the exception of the Spikes.

The second time you use the Super Zapper it will only destroy the enemy that it considers to be of the greatest immediate threat.

Your electrical adversaries vary in aggressiveness and cunning — and so the points you are awarded for electrocuting them vary accordingly as well.

Trickiest of all are the Flippers which can flip from lane to lane and move at lightning speed. The best way to deal with these ominous star shapes is to shoot them fast before they reach the end of a lane.

Tankers present little threat in themselves but you still have to pick them off before they reach the top of a lane as they will then spawn two Flippers. If this happens you will have to spin right and fire and then spin left and fire to pick off the two newly born Flippers before they can cause you any harm.

Fuseballs are also difficult to deal with and are the key to high scores — particularly at the higher levels of play. These red, yellow, and blue snowflake structures are difficult to shoot as they change lanes and dodge up and down to avoid your fire. Fuseballs are worth having at 250, 500 or 750 points depending on the level of play.

Pulsars can short circuit lanes and hem you in a restricted sector of the pattern as it is impossible for you to cross lanes that have been short circuited. Pulsars can only be killed when they are in the process of crossing lanes. Pulsars must be killed at the earliest possible opportunity. They are worth 200 points.

Spikers are slow moving enemies worth only 50 points but it is as well to get them early if you can as they can shoot spikes which can cause you problems when you try to move onto a new pattern.

There are basically two types of pattern in Tempest. Patterns that you can spin right round and patterns that you cannot spin right around. In the latter case you must find a safe place at the right or left extremity of the pattern from which you can shoot your trickiest opponents.

Whatever the pattern shape the golden rule is to move and fire constantly. You will not stay alive long in Tempest if you stay in one place.

Skilled players can choose to commence their game at a higher level — there are five entry levels. It is also possible to begin a new game where you left off if you have reached a sufficiently high level as long as you insert your coins within 30 seconds of the previous game ending.

BIRD WATCHING ON THE FAIRWAYS

BIRDIE KING

Take to the fairways of your local arcade and see if you can club your way round this nine-hole golf course.

There are two balls to keep an eye on in this game. The one which you address with your club on the screen and the "roller ball" which is the only control needed to play it.

The roller ball dictates distance of shot and accuracy by the speed and direction you run your hand over it.

It is a tricky piece of control which will quickly single out the skilful players. There are nine holes in the basic game with extra holes awarded to players who notch up under-par scores such as Birdies, Eagles and Albatrosses, for one, two or three-under-par scores. Hence the name of the game.

The hole-in-one player won't have to buy a round of drinks afterwards but he should notch up six extra holes to play.

The beginner must take care to look at the flag, which indicates how the wind is blowing. It is possible for him to go out-of-bounds and forfeit a stroke or ruin his chances by going more than three over par — the machine can be altered by the operator to call a halt when so many strokes over par are scored by the player. Three is the most difficult setting.

The holes increase in difficulty as the game goes on, but beginners have a good chance of progressing a good way into the game and so learning it.

Illustration: Jon Davis

ACTION

Illustration: Terry Rogers

WE'RE GOING APE OVER TARZAN!

JUNGLE KING

You may not be able to beat the game but at least you can beat your chest in Jungle King.

If the famous Ape-man Tarzan was your boy- (or girl-)hood hero be prepared for a few surprises in this video version of jungle life.

For a start there's trouble with

Cheetah, the silly chimp and his monkey mates just can't seem to stay out of Tarzan's way as he swings through his jungle home.

The first phase of the game sees Tarzan swinging on the lianas that hang from the trees. You must judge his jumps for him by use of a jump button and a four-way joystick. But watch out for those clumsy monkeys.

Having survived this aerial journey between the branches, Tarzan's next task is fairly standard piece of daring-do, he leaps into the water to take on the crocodiles.

Armed only with a knife and making good use of the joystick and the stab button he swims along under water battling off the crocs and making the most of the available air pockets. Occasionally he will get trapped in an air-pocket and be carried helplessly to the surface.

The third stage of the game involves a steep hill and a landslide of boulders falling down it. Tarzan has two choices here, he can either jump over the low bouncing ones or fall flat beneath the higher ones.

The final scenario fulfils Tarzan's worst fears: "Jane, she

captured by cannibals!" And the painted devils are lowering our heroine into the cooking pot too. The cannibals are armed with spears and Tarzan has lost his knife but must try to stay out of range of the spears and jump over the cannibals to perform his rescue.

And then the whole sequence starts again except that things are speeded up, with more hazards.

The game comes with a nice line in graphics, jungle noises and beat the chest-type Tarzan roars.

your ability to steer round your opponent. You must draw a complete line with your solid slip-stream around the bike which is chasing you.

The Grid Bug test is the most difficult of all. The Grid Bugs are a breed of computerised spiders who swarm down towards you, preventing your entry to the transporter, which will take you safely on to the next challenge.

The fourth challenge, Tank Chase, incorporates a Pacman type maze. You steer your tank through the maze seeking out your opponent at who you then fire — using the Tron arm control to turn the gun turret.

YOU'VE SEEN THE FILM

ARCADE TRON

Tron — the new science fantasy film from Walt Disney Productions takes place — in case you don't already know by now — inside a computer. The hero of the film is challenged to fight for his life in a series of video style games.

Arcade Tron is manufactured by Bally Midway and goes on general release in the UK this Autumn to coincide with the release of the film.

The game is already a big success in the United States. A nationwide competition has already been played. The champ clocked up more than a million points in a marathon eight hour game.

The controls are fairly simple. You have a Gorf type joystick — which you can grasp firmly in your whole hand, using your index finger to fire. You also have a knob which can turn Tron's arm through 360 degrees. There are four levels of play — all based on

themes from the film.

The Cone Challenge is based on Tron's attempt to get into the MCP — the computer's nerve-centre — before he can destroy it.

You have to rise up through the cone shooting out all the colourful bricks which appear — one after the other, to block your way. If you touch any of these bricks on your way up you will be "de-rezzed". Tronology for being killed.

The Light Cycle is a test of your speed of reaction and of

Walt Disney Productions

PINBALL

Hot on the heels of Mr and Mrs Pac-Man-Bally's adaptation of a video game theme — comes a true pinball/video combination called Caveman.

Gottlieb are the people behind this innovation in pin-table design which features a video screen within the playfield. It's "The best of Both Worlds" as the publicity blurb says.

You have to trap the ball in one of two special channels before you'll get a crack at the video game feature. This is a maze type game which shows a caveman chasing various dinosaurs. But he in turn is pursued by a killer Tyrannosaurus.

If this killer beast catches your caveman the ball drains and the pintable is back in action.

There is a joystick attachment at the front of the table which is used to direct the caveman around the maze when the video is activated.

Hitting targets on the table also affects play in the video game maze. Hitting drop targets and rollovers will replace Tyrannosaurus with bonus scoring Pterodactyls in the video maze. Hitting the vari-targets determines how long these flying horrors stay on the screen.

Gottlieb hope that this combination will make video players take a look at pinball — and pinball players at video games.

We'd like to tell you a bit more about the game — but the table has proved difficult to track down. Gary Flower of the Pinball Owners Association says one member has reported a sighting of this intriguing pin — maybe someone out there has played on one? How about letting us know what you thought?

```
   1 DEF FN R(x)=INT (RND*x)+1
   2 GO SUB 7000
   5 GO SUB 7200
  10 REM towns & aliens
  20 LET w1=BIN 11111101
  30 LET w2=BIN 11111111
  40 LET w3=BIN 10000000
  50 LET w4=BIN 00000011
  60 FOR i=0 TO 7
  70 READ j
  80 POKE USR "A"+i,j
  90 NEXT i
 100 DATA w2,w1,w1,BIN 11011101,
BIN 10001101,BIN 10100100,w3,w3
 110 FOR i=0 TO 7: READ j
 120 POKE USR "B"+i,j
 130 NEXT i
 140 DATA w2,w2,BIN 10111111,BIN
00010011,w4,w4,w4,BIN 00000001
 160 FOR i=0 TO 7: READ j
 150 POKE USR "C"+i,j: NEXT i
 170 DATA 0,BIN 00011000,BIN 011
11110,BIN 11011011,BIN 11111111,
BIN 01100110,0,0
 300 DIM r(20,30)
 320 DIM h(20,30)
 340 DIM d(6)      DIM s(5)
 400 DATA 3,7,15,17,7,27,9,21,11,
9,13,15,15,17,27
 410 DATA 7,15,17,13,17,15,17,17
 430 DATA 1,3,11,3,3,19,27
 440 DATA 7,11,9,11,11,11,11,19
 460 DATA 9,29,9,27,11,11,3
 500 LET ea=18: LET eb=18
 520 LET t=2: LET q=0
 530 LET p1=0: LET p2=0: LET p3=
 620 GO SUB 3000
 640 GO SUB 3000
 660 GO SUB 4000
 680 GO SUB 4100
 700 LET wn=FN R(8): LET wa=FN R
(8)
 704 LET rc=FN R(4)*5
 708 LET rh=FN R(4)*5
 712 LET k2=1: LET k3=1: LET k5=
 716 FOR q=1 TO 30
 720 GO SUB 4340
 725 NEXT q
 730 GO SUB 7470
 740 GO SUB 4350
 750 GO TO 730
1000 STOP
2000 REM DRAW TOWNS
2010 FOR i=1 TO 5
2020 READ d(i): READ e(i)
2030 NEXT i
2035 FOR i=1 TO 5
2040 PRINT AT d(i)+1,e(i);" "
2050 LET z(d(i),e(i))=e(i)+6
2060 LET z(d(i),e(i)+1)=e(i)+6
2070 LET z(d(i)+1,e(i))=i+6
2080 LET z(d(i)+1,e(i))=i+6
2085 PRINT AT 10,22;"2": PRINT A
T 12,10;"1"
2090 NEXT i
2100 RETURN
3000 REM DRAW BOARD
3010 LET c=2
3020 FOR i=1 TO 5
3030 FOR j=1 TO 4
3040 READ b: READ a
3050 PRINT AT b,a; PAPER c;" "
3060 PRINT AT b+1,a; PAPER c;" "
3070 PRINT AT b,a+1; PAPER c;" "
3080 PRINT AT b+1,a+1; PAPER c;" "
3090 LET z(b,a)=c
3100 LET z(b,a+1)=c
3110 LET z(b+1,a)=c
3120 LET z(b+1,a)=c
3130 NEXT j
3140 LET c=c+1
3150 NEXT i
3160 RETURN
3170 FOR i=1 TO 10
3180 PRINT AT i*2-1,0;CHR$ (i+79)
3190 NEXT i
3200 FOR i=1 TO 15
3210 PRINT AT i*2-1;CHR$ (i+64)
3220 NEXT i
3230 PLOT 0,8: DRAW 239,0: DRAW
0,159: DRAW -239,0: DRAW 0,-159
3250 RETURN
4000 REM SPACECRAFT CODES
4015 DIM s(5)
4015 RANDOMIZE
```

SPACE WATCH

U.F.O. sightings have been reported over a large area and the evidence is pouring into Space Watch headquarters.

You are in charge of the search teams which must be sent out to try and find the aliens before a similar agency from a foreign power can contact them.

The alien sightings are the clue to how they can be tracked down and the code (a sort of Close Encounters sounds sequence, except that it is in colour) which must be used in making contact.

There are five alien craft in the vicinity and the information you have so far received has tempted you to give each craft a name.

The Mothership is always the same colour as the Watcher and appears in the centre of the screen.

The Chaser is so-named because of its speed, it flies rapidly across the boundaries of the land but never deviates from a straight line flight path.

The Hoverer also follows a straight flight path but is slower, travelling just half a sector each turn compared to the Chaser's whole sector.

The Watcher pursues a circular path either one or a half sector is crossed in a day.

But the enigmatic Destroyer follows no fixed route although it does seem to travel just half a sector at a time. This means the most easy to confuse in sightings as it may sometimes copy the flight patterns of the Hoverer and Watcher craft.

The aliens are wary of humans, and unless contact is made quickly there is a very real fear that the Destroyer will live up to his name.

The aim of the game is to find the alien code of five colours and put them in the right order you will then be able to make contact.

Each search you undertake can be across, one sector, two sectors or 16 sectors of the board. But each search depletes your energy reserves and before you can spot the Destroyer will move in to try and blow-up your Space Watch H.Q.

Each search is also given a colour code. And only that colour of craft will show up. If you key in red (2), only a red craft will show on your radar scan, all others will remain invisible. You will also be able to see which areas your opponent is searching and whether he finds any craft.

When you think you know the code of each craft you can try out your guess. Inputting the information in the order: Mothership, Chaser, Hoverer, Watcher, Destroyer. So, discovering which of the craft you are tracking, is which, is vital.

There are a couple of other twists: a red craft will not show up on a red background. And if you see the Destroyer moving close to your City HQ (marked with a "1" and "2" for first and second player) you can expend energy setting up a defensive screen around the HQ.

The game starts with UFO sightings coming in from the cities and these usually dictate the tactics for the rest of the game.

```
4020 FOR i=2 TO 5
4030 LET s(i)=FN R(5)+1
4055 NEXT i
4055 LET s(1)=s(4)
4060 RETURN
4100 REM PLOT INITIAL POSITIONS
4110 LET my=FN R(8)
4115 LET mx=FN R(18)+1
4130 IF z(my,mx)=1) THEN GO TO
 4110
4140 IF z(my,mx)>6 THEN GO TO 41
10
4145 LET k=1: GO SUB 4700: GO SU
B 4800
4150 LET cy=FN R(20)
4160 LET cx=FN R(30)
4162 LET k=2: GO SUB 4700: GO SU
B 4800
4180 LET hy=FN R(20)
4190 LET hx=FN R(30)
4192 LET k=3: GO SUB 4700: GO SU
B 4800
4210 LET wy=FN R(8)+6
4220 LET wx=FN R(8)+6
4222 LET k=4: GO SUB 4700: GO SU
B 4800
4230 LET dy=FN R(20)
4240 LET dx=FN R(30)
4242 LET k=5: GO SUB 4700: GO SU
B 4800
4300 RETURN
4340 REM move craft
4343 PRINT AT 21,0,"City check o
f UFOs No.",s
4350 LET k=1: GO SUB 4700: GO SU
B 4850
4358 REM watcher
4360 LET y=wy: LET x=wx
4380 GO SUB 5500
4401 LET wn=wn+1: IF wn>9 THEN L
ET wn=1
4410 LET k=4: GO SUB 4700: GO SU
B 4800: GO SUB 4850: GO SUB 6000
4415 GO SUB 4700: GO SUB 6000
4420 REM chaser
4422 LET y=cy: LET x=cx
4425 LET sd=fc+4855
4427 IF k=5 THEN GO TO 4434
4432 LET k=2: GO SUB 4700: GO SU
B 4850
```

```
4432 IF k2=2 THEN GO TO 4550
4434 GO SUB 4700: GO SUB 4800: G
O SUB 4850
4436 GO SUB 6000
4438 GO SUB 6000
4440 REM hoverer
4441 LET k=5
4442 LET y=hy: LET x=hx
4445 LET sd=rh+4820
4447 IF k=5 THEN GO TO 4453
4448 GO SUB 4700: GO SUB 4850
4451 LET k3=5 THEN GO SUB 4550
4453 LET k=3: GO SUB 4700: GO SU
B 4850
4457 LET k3=5 THEN GO SUB 4800: G
O SUB 4850
4460 REM destroyer
4462 LET k=5
4470 LET y=dy: LET x=dx
4475 LET sd=fd+4855
4482 GO SUB 4700: GO SUB 4850
4485 GO SUB 6000
4490 IF k=5 THEN GO SUB 4540
4500 GO SUB 4700: GO SUB 4800: G
O SUB 4850
4507 IF ea<6 THEN LET p5=1: GO S
UB 8300
4510 IF b<6 THEN GO SUB 8300
4515 RETURN
4540 LET dy=y: LET dx=x
 1: GO TO 4470
4550 LET cy=y: LET cx=x: LET k2=
1: GO TO 4550
4600 LET cx=cx-2: RETURN
4610 LET cx=cx+2: RETURN
4613 LET cy=cy-2: RETURN
4615 LET cy=cy+2: RETURN
4620 LET hx=hx-1: RETURN
4630 LET hx=hx+1: RETURN
4665 LET hy=hy-1: RETURN
4670 LET hy=hy+1: RETURN
4700 REM check coordinates
4710 IF x<1 THEN LET f=xx: LET s
```

```
4750   RETURN
4755   IF k=2 THEN LET f=cx: LET g
=cy: RETURN
4760   IF k=3 THEN LET f=wx: LET g
=wy: RETURN
4765   RETURN
4770   IF k=4 THEN LET f=dx: LET g
=dy: RETURN
4780   RETURN
4790   IF k=5 THEN LET f=dx: LET g
=dy: RETURN
4795   RETURN
4800   REM remember craft position
4810   LET h(g,f)=k
4820   RETURN
4830   LET h(y,x)=0
4840   RETURN
4850   REM borders
4860   IF f<1 THEN GO SUB 5000
4864   IF g<1 THEN GO SUB 5000
4868   IF f>20 THEN GO SUB 5000
4870   IF g>20 THEN GO SUB 5000
4875   RETURN
4890   REM redraw towns
4910   FOR i=1 TO 8
4920   PRINT AT d(i),e(i),"   ":
4925   PRINT AT d(i)+1,e(i);
4930   NEXT i
4935   PRINT AT 10,22;"2": PRINT A
T 13,18;"3"
4940   PLOT 8,5: DRAW 239,0: DRAW
-159
4945   PLOT 8,5: DRAW 239,0, DRAW
-159, 0: DRAW -239,0: DRAW 0,-159
4950   RETURN
5020   IF k=2 THEN GO SUB 5100: RE
TURN
5030   IF k=3 THEN GO SUB 5130: RE
TURN
5040   LET k5=5: RETURN
5100   LET k5=5
5110   IF rc=5 THEN LET rc=10: RET
URN
5115   IF rc=15 THEN LET rc=20: RE
TURN
5120   LET k5=5
5130   IF rc=rc-5 THEN LET rc=20
5140   IF rh=5 THEN LET rh=10: RE
TURN
5145   IF rh=15 THEN LET rh=20: RE
TURN
5150   LET rh=rh-5: RETURN
5500   REM watchers circle
5510   IF wn=1 THEN LET wx=wx-wb:
RETURN
5520   IF wn=2 THEN LET wx=wx+wb:
RETURN
5530   IF wn=3 THEN LET wy=wy-wb:
RETURN
5540   IF wn=4 THEN LET wy=wy+wb:
RETURN
5550   IF wn=5 THEN LET wx=wx+wb:
RETURN
5560   IF wn=6 THEN LET wy=wy+wb:
LET wx=wx-wb: RETURN
5570   IF wn=7 THEN LET wy=wy+wb:
RETURN
5580   REM craft over cities
6020   IF z(g,f)>6 THEN GO SUB 605
0
6040   RETURN
6050   FOR j=1 TO 8
6060   IF z(g,f)=j+8 THEN GO SUB 6
000
6070   NEXT j: RETURN
6080   PRINT AT d(j)+1,e(j): INK 3
(j): BEEP
6090   PAUSE 200: PRINT AT d(j)+1,
6095   RETURN
6500   REM colour check
6510   PRINT AT c$="Please put in your
colour code": GO SUB 7900
6520   INPUT s c
6530   IF sc<20 OR sc>6 THEN LET c$
="Please enter between 0
 and 6": GO SUB 7900: GO TO 6510
6540   IF en=1 THEN LET v3=-1: LET
6550   IF en=2 THEN LET v3=-3: LET
6553   IF en=3 THEN LET v3=-3: LET
6557   FOR i=v3 TO v4: FOR j=v3 TO
v4
6560   IF h(yc*2+i,xc*2+j)=0 THEN
```

```
                        GO TO 6580
6570   IF z(yc*2+i,xc*2+j)=sc THEN
                        GO TO 6596
6575   IF h(yc*2+i,xc*2+j)=sc T
HEN GO SUB 6600
6580   NEXT j: NEXT i
6585   IF q1=0 THEN LET c$="No cra
ft of that colour here": GO SUB
6590
6588   LET q1=0
6595   RETURN
6600   REM print findings
6610   PRINT AT yc*2+i,xc*2+j: PAP
6620   PAUSE 100
6630   PRINT AT yc*2+i,xc*2+j: PAP
6635
6640   LET q1=1
6645   IF en>0 THEN GO TO 6650
6645   CIRCLE xi,v2,cc
6650   CIRCLE v1,8,v2+8,cc: RETURN
7420   GO SUB 7460: CLS
7430   PRINT "But a warning if you
r energy is below 6 the Destroye
r can move"
7435   PRINT "in and bomb your cit
y if it is flying over that
city sector"
7437   PRINT : PRINT "The first
player's city is shown in a 1 T
he second player's by a 2.
7440   PRINT "You can prevent this
by using 3 energy points to set
up a screen around your town"
7445   PRINT : PRINT "Important:
A player should not watch the
screen whilst his oppo-nent enter
s his colour code
7450   GO SUB 7460: CLS : RETURN
7460   LET c$="Hit 'enter' to cont
inue": GO SUB 7900
7462   INPUT i$
7465   RETURN
7470   REM which player
7475   IF t=1 THEN LET t=2: GO TO
7480
7478   IF t=2 THEN LET t=1
7480   LET t2=t
7485   GO SUB 4500
7490   IF t=1 THEN LET ea=ea-en
7495   IF t=2 THEN LET eb=eb-en
7497   RETURN
7500   REM move
7500   IF t=1 THEN LET ec=ea
7505   IF t=2 THEN LET ec=eb
7510   IF t=1 THEN PRINT AT 21,0;"
It is ";t;"'s turn to search":
PAUSE 100
7520   IF t=2 THEN PRINT AT 21,0;"
It is ";t;"'s turn to search":
PAUSE 100
7522   PRINT AT 21,0;"You have ";e
c;" energy left"        PAUSE
100
7530   LET c$="Do you want to gues
s alien code?": GO SUB 7900
7540   INPUT i$: IF i$="y" THEN GO
SUB 7600
7550   PRINT AT c$="How much energy wi
ll you use?": GO SUB 7900
7555   INPUT en
7590   IF en>ec THEN LET c$="you d
on't have that much energy": GO
SUB 7900: GO TO 7650
7600   IF en=1 THEN GO SUB 7651
7610   IF en=2 THEN GO SUB 7642
7620   IF en=3 THEN GO SUB 7643
7630   IF en>3 THEN GO SUB 8500: R
ETURN
7640   LET c$="Please re-assess en
ergy use": GO SUB 7900: GO TO 75
7642   LET c$="I need a central co
-ordinate to": GO SUB 7900
7645   LET c$="use as a base for t
his search": GO SUB 7900
7651   LET c$="Name the square:cap
itals please": GO SUB 7900
7652   LET c$="Vertical co-ordinate
first": GO SUB 7900: GO TO
7720
7670   IF en=1 THEN LET cc=1: LET
cc=16: GO TO 7700
7690   LET cc=2: LET cc=32
```

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```
7700 IF yc<(xc OR yc)>=(12-cc) TH
EN LET c$="your search is too cl
ose to edge": GO SUB 7900: GO TO
 7642
7710 IF xc<cc OR xc>=(17-cc) THE
N LET c$="your search is too cl
ose to edge": GO SUB 7900: GO TO
 7642
7720 LET v1=xc*16-1: LET v2=175-
16*yc
7725 IF en>0 THEN GO TO 7740
7730 CIRCLE OVER 1;v1,v2;cc: GO
SUB 6500: CIRCLE OVER 1;v1,v2,cc
: RETURN
7740 CIRCLE OVER 1;v1-8,v2+8,cc
v2+8,cc: RETURN
7900 PRINT AT 21,0;c$: PAUSE 100
7910 PRINT AT 21,0;"": RETURN
7940 INPUT v$
7950 LET vc=CODE v$-79
7960 IF yc<1 OR yc>10 THEN GO SU
B 7990: GO TO 7940
7965 INPUT x$
7970 LET xc=CODE x$-64
7975 IF xc<1 OR xc>15 THEN GO SU
B 7990: GO TO 7965
7980 RETURN
7990 LET c$="Wrong letter:please
 try again": GO SUB 7900
7995 RETURN
8005 REM match code
8010 CLS : PRINT AT 6,0;"Input t
he colours in order"
8020 PRINT AT 7,0;"Mothership,Ch
aser,Hover..."
8040 PRINT "Watcher,Destroyer,"
8050 FOR i=1 TO 5
8060 INPUT a$: IF (a$<1 OR a$>6) THEN
 GO TO 8060
8065 PRINT INK i;"*": IF i<>s(i)
8070 NEXT i
8080 IF p1=1 THEN PRINT b$;" is t
he winner"
8085 IF p=1 THEN PRINT a$;" is t
he winner"
8095 IF p=2 THEN PRINT b$;" is t
he winner"
8100 STOP
8105 PRINT "Correct!"
8110 FOR i=1 TO 5: PRINT INK s(i
8110 ... NEXT i
8120 IF p=1 THEN PRINT b$;" is t
he winner": STOP
8130 IF p=2 THEN PRINT a$;" is t
he winner": STOP
8300 REM destroy
8310 IF p1=1 AND p3=1 THEN RETUR
N
8320 IF p2=1 THEN RETURN
8330 IF dx<22 OR dx>24 THEN RETU
RN
8340 IF dy<9 OR dy>10 THEN RETUR
N
8350 IF dx<22 OR dx>23 THEN RETU
RN
8355 LET c$="The destroyer has b
ombed your HQ": GO SUB 7900
8360 PRINT AT 21,0;a$;" is the w
inner": STOP
8360 IF dy<11 OR dy>12 THEN RETU
RN
8370 IF dx<10 OR dx>11 THEN RETU
RN
8800 LET c$="The destroyer has b
ombed your HQ": GO SUB 7900
8900 PRINT AT 21,0;b$;" is the w
inner": STOP
8810 REM city defence
8810 LET c$="I have put a defens
ive screen": GO SUB 7900
8815 LET c$="Around your city be
ware adversaries": GO SUB 7900
8820 IF p=1 THEN LET p1=1: GO TO
 8850
8850 LET p2=1
8880 RETURN
7000 REM players names
8000 BORDER 0: PAPER 0: CLS : IN
K 7
7010 FOR i=1 TO 30
7030 LET t=FN R(255): LET u=FN R
(175)
7040 PLOT t,u: NEXT i
```

```
7050 INK 6: PRINT AT 5,8;"YOU AR
E ENTERING": PAUSE 30
7060 PRINT AT 7,7;"A PROHIBITED
AREA--": INK 7: PAUSE 30
7070 PRINT AT 9,10; FLASH 1;"SPA
CE WATCH"
7080 PRINT AT 13,9;"PERSONNEL ON
LY": PAUSE 50: FLASH 0
7090 PAUSE 70: PAPER 7: CLS : IN
K 0: RETURN
7200 LET c$="WELCOME TO PROJECT
SPACE WATCH": GO SUB 7900
7210 LET c$="PLAYER 1: PLEASE EN
TER YOUR NAME": GO SUB 7900: INP
UT a$
7215 IF LEN a$>8 THEN LET c$="ei
ght characters only please": GO
SUB 7900: GO TO 7210
7210 LET c$="PLAYER 2: PLEASE EN
TER YOUR NAME": GO SUB 7900: INP
UT b$
7225 IF LEN b$>8 THEN LET c$="ei
ght letters only please": GO SUB
 7900: GO TO 7210
7250 LET c$="DO YOU WANT INSTRUC
TIONS y OR n?": GO SUB 7900
7260 INPUT i$: IF i$="y" THEN GO
 TO 7300
7270 RETURN
7300 REM instructions
7305 PRINT AT 0,0;"INSTRUCTIONS"
: GO SUB 7460: CLS
7310 PRINT "Space watch is for t
wo players. Each is trying to co
ntrol aliens"
7320 PRINT "which have five craf
t on Earth.": PRINT : INK 3
7325 PRINT "The game starts with
 UFO reports coming in from the
city squares"
7335 PRINT "30 reports show if a
 craft has moved over any city
in every movement turn"
7337 PRINT : PRINT "It may be
wise to chart these reports":
GO SUB 7460: CLS
7340 PRINT "The aliens each have
 a colour code and a unique fl
ight pattern to distinguish them
": INK 1
7345 PRINT : INK 1
7350 PRINT "The craft, in order,
 are:"
7354 PRINT "Mothership-never mov
es"
7358 PRINT "Chaser-fast straight
 flights"
7362 PRINT "Hoverer-slow straigh
t"
7366 PRINT "Watcher-circles"
7370 PRINT "Destroyer-slow rando
m pattern"
7375 GO SUB 7460: CLS
7385 PRINT "Players search the b
oard sectors using energy and col
our code"
7390 PRINT "More energy is used
up by large searches:1 sector =
8 energy"
7395 PRINT "4 sectors=4 energy;
16 sectors = 8 energy"
7400 PRINT : PRINT "The colour
code will only show up craft of
 the same colour"
7405 PRINT "The codes can be 2-6
: matching  craft colours are:red
 magenta, green,cyan and yello
w"
7410 PRINT "A craft on its own
colour background will not show
on a search"
7420 PRINT : INK 0: PRINT "By
searching the player will disco
ver the colour code of each"
7425 PRINT "He can then enter th
e codes (in the right order) and
win"
```

WORD SEARCH

RUNS ON A ZX81 IN 16K
BY TUDOR COSTIGAN

Why not dip into your Oxford English Dictionary and engage your ZX81 in a war of words? This game is for the more literary minded among you — a sort of computerised crossword.

You simply type in up to nine words all the same length — anything from two to nine characters. The computer will then hide them in a 15 by 20 matrix jumbled up with other random letters. All you have to do is find where the computer has hidden the words.

You have to tell it the co-ordinates of the first letter, the direction of the word and the number of the word. As you find the words the computer "inverts" them on the screen.

```
  5 RAND
 10 DIM A$(15,20)
 20 PRINT "   WORD SEARCH"
 30 PRINT ">>>>8<<<<<"
 35 GOSUB 9000
 40 PRINT AT 6,0;"HOW MANY WORD
3  :HSX=9? ?"
 50 INPUT 5
 60 IF 5<1 OR 5>9 THEN GOTO 50
 70 LET NU=5
 75 LET NUTF=NU
 78 FOR 5=1 TO 40
 76 NEXT 0
 80 PRINT AT 6,0;"HOW MANY LETT
ERS WILL EACH WORD  ?"
 81 PRINT "HAVE ?"
 85 IF INKEY$="" THEN GOTO 85
 90 LET 5$=INKEY$
 94 IF CODE (5$)<30 OR CODE (5$
)>39 THEN GOTO 85
 95 LET LENGTH=CODE (5$)-28
 96 PRINT AT 6,0;"
                      "
 99 DIM US(NU,LENGTH)
100 FOR Z=1 TO NU
110 PRINT AT 21,0;"WORD ";Z;" ?
"
120 INPUT X$
131 IF LEN (X$)<>LENGTH THEN GO
TO 120
132 IF X$=U$(5) THEN GOTO 120
133 NEXT 5
140 LET U$(Z)=X$
150 NEXT Z
160 CLS
165 FAST
170 FOR Z=1 TO NU
180 FOR Z=1 TO NU
190 LET Y=15
200 LET X=8$
210 LET RND=INT (RND*8) +1
220 GOTO RND+100+1000
240 NEXT Z
241 FOR X=1 TO 20
250 FOR Y=1 TO 15
260 IF A$(Y,X)=" " THEN GOSUB 3
B1
270 PRINT AT Y,X;A$(Y,X)
280 NEXT Y
290 NEXT X
295 GOTO 325
300 LET 5$=CHR$ (INT (RND*26) +3
B1
310 LET A$(Y,X)=5$
```

HERE IS A LIST OF THE VARIABLES USED:

A$(15,20) : THE DISPLAYED ARRAY OF LETTERS.
NU : THE NO. OF WORDS.
NUTF : THE NO. OF WORDS LEFT TO FIND.
LENGTH : THE LENGTH OF THE WORDS.
U$(NU,LENGTH) : THE LIST OF WORDS DISPLAYED TO THE RIGHT OF THE SCREEN.
5$: A RANDOM LETTER.
D : THE DIRECTION OF A WORD.
N : THE NO. IN THE LIST OF THE WORD.
0,U,X,Y,Z : GENERAL VARIABLES USED THROUGHOUT THE PROGRAM IN LOOPS, ETC.

Illustration: Dorian Cross

```
320 RETURN
330 FOR Z=0 TO 16
331 PRINT AT Z,0;"█"
331 PRINT AT Z,21;"█"
332 NEXT Z
333 PRINT AT 0,23;"WORDS TO"
335 PRINT AT 2,23;"FIND:"
336 PRINT AT 3,25;"█"
337 FOR Z=3 TO NU
340 PRINT AT 4+Z,22;Z;U$(Z)
345 NEXT Z
360 FOR Z=3 TO 21
365 PRINT AT 16,2;"█"
370 PRINT AT 16,2;"█"
380 NEXT Z
390 SLOW
400 IF NUFF=0 THEN GOTO 8000
401 PRINT AT 19,0;"WHERE IS THE
FIRST LETTER OF
410 PRINT "THE WORD (Y,X) ?"
415 PRINT AT 21,0;"  "
420 INPUT Y
430 PRINT AT 21,0;Y;",",
440 INPUT X
445 PRINT AT 21,0;Y;",";X
460 PRINT AT 18,0;"IN WHAT DIREC
TION GOES THE WORD
470 PRINT "(0-8) ?"
480 INPUT D
490 IF Y<1 OR Y>15 OR X<1 OR X>2
0 THEN GOTO 400
500 FOR Z=1 TO 8
520 IF Z=D THEN GOTO 540
530 NEXT Z
540 GOTO 400
550 PRINT AT 18,0;"WHICH NUMBER
IN THE LIST IS THE WORD
560 INPUT N
570 IF N<1 OR N>NW THEN GOTO 40
580 GOTO 230
590 LET D=D*100+1800
600 STOP
1100 LET Y=Y-LENGTH
1110 LET Y=INT (RND*Y)+1
1120 LET X=INT (RND*X)
1130 FOR U=1 TO LENGTH
1140 IF A$(Y+U,X)<>" " AND A$(Y+
U,X)<>U$(Z)(U TO U) THEN GOTO 19
1150 LET A$(Y+U,X)=U$(Z)(U TO U)
1160 NEXT U
1170 GOTO 230
1180 LET X=X-LENGTH
1200 LET X=INT (RND*X)
1230 LET X=INT (RND*X)+2+LENGTH
```

```
1240 FOR U=1 TO LENGTH
1245 IF A$(Y+U,X-U)<>" " AND A$(
Y+U,X-U)<>U$(Z)(U TO U) THEN GOT
O 190
1250 LET A$(Y+U,X-U)=U$(Z)(U TO U)
1260 NEXT U
1270 GOTO 230
1300 LET Y=Y-LENGTH
1310 LET Y=INT (RND*Y)+1
1320 LET X=INT (RND*X)+2+LENGTH
1330 FOR U=1 TO LENGTH
1340 IF A$(Y-U,X-U)<>" " AND A$(
Y-U,X-U)<>U$(Z)(U TO U) THEN GOTO
190
1350 LET A$(Y-U,X-U)=U$(Z)(U TO U)
1360 NEXT U
1370 GOTO 230
1400 LET Y=Y-LENGTH
1410 LET Y=INT (RND*Y)+1
1420 LET X=INT (RND*X)+2+LENGTH
1430 FOR U=1 TO LENGTH
1440 IF A$(Y-U,X-U)<>" " AND A$(
Y-U,X-U)<>U$(Z)(U TO U) THEN GOTO
190
1450 LET A$(Y-U,X-U)=U$(Z)(U TO U)
1460 NEXT U
1470 GOTO 230
1500 LET Y=Y-LENGTH
1510 LET Y=INT (RND*Y)+LENGTH
1530 LET X=INT (RND*X)
1540 IF A$(Y-U,X)<>" " AND A$(Y-
U,X)<>U$(Z)(U TO U) THEN GOTO 19
1550 LET A$(Y-U,X)=U$(Z)(U TO U)
1560 NEXT U
1570 GOTO 230
1600 LET X=X-LENGTH
1620 LET X=INT (RND*X)+2+LENGTH
1640 LET Y=INT (RND*Y)+1
1650 FOR U=1 TO LENGTH
1650 IF A$(Y-U,X)<>" " AND A$(Y-
U,X)<>U$(Z)(U TO U) THEN GOTO 19
1660 LET A$(Y-U,X)=U$(Z)(U TO U)
1670 NEXT U
1680 GOTO 230
1700 LET Y=Y-LENGTH
1710 LET Y=INT (RND*Y)+1
1720 LET X=INT (RND*X)
1740 IF A$(Y+U,X)<>" " AND A$(Y+
U,X)<>U$(Z)(U TO U) THEN GOTO 19
1750 LET A$(Y+U,X)=U$(Z)(U TO U)
1760 NEXT U
1770 GOTO 230
1800 LET X=X-LENGTH
```

```
1010 LET Y=Y-LENGTH
1020 LET Y=INT (RND*Y)
1030 LET X=INT (RND*X)
1050 IF A$(Y+U,X+U)<>" " AND A$
     (Y+U,X+U)<>W$(Z)(U TO U) THEN GOT
     O 190
1060 LET A$(Y+U,X+U)=W$(Z)(U TO U)
1070 NEXT U
1080 GOTO 230
1900 IF (Y-1)+LENGTH>15 THEN GOT
     O 400
1910 FOR U=1 TO LENGTH
1920 IF A$(Y+U,X)<>W$(N)(U TO U)
     THEN GOTO 400
1930 NEXT U
1940 FOR U=1 TO LENGTH
1950 LET Q=CODE (W$(N)(U TO U))
1955 LET Q=Q+128
1960 LET W$(N)(U TO U)=CHR$ (Q)
1970 PRINT AT Y+U,X;CHR$ (Q)
1975 PRINT AT N+4,22+U;CHR$ (Q)
1985 LET NUTF=NUTF-1
1990 GOTO 400
2000 IF (Y-1)+LENGTH>15 OR (X+1)
     -LENGTH<1 THEN GOTO 400
2010 LET Y=Y-1
2020 LET X=X+1
2005 IF A$(Y+U,X-U)<>W$(N)(U TO U)
     THEN GOTO 400
2040 FOR U=1 TO LENGTH
2050 LET Q=CODE (W$(N)(U TO U))
2060 LET Q=Q+128
2070 LET W$(N)(U TO U)=CHR$ (Q)
2075 PRINT AT Y+U,X-U;CHR$ (Q)
2077 PRINT AT N+4,22+U;CHR$ (Q)
2080 NEXT U
2090 LET NUTF=NUTF-1
2100 GOTO 400
2110 IF (X+1)-LENGTH<1 THEN GOTO
     400
2115 LET X=X+1
2130 IF A$(Y,X-U)<>W$(N)(U TO U)
     THEN GOTO 400
2140 NEXT U
2120 FOR U=1 TO LENGTH
2150 LET Q=CODE (W$(N)(U TO U))
2160 LET Q=Q+128
2170 LET W$(N)(U TO U)=CHR$ (Q)
2175 PRINT AT Y,X-U;CHR$ (Q)
2175 PRINT AT N+4,22+U;CHR$ (Q)
2180 NEXT U
2185 LET NUTF=NUTF-1
2190 IF (X+1)-LENGTH<1 OR (Y+1)-
     LENGTH<1 THEN GOTO 400
2205 LET Y=Y+1
2205 LET X=X+1
2210 IF A$(Y-U,X-U)<>W$(N)(U TO U)
     THEN GOTO 400
2250 NEXT U
2240 FOR U=1 TO LENGTH
2250 LET Q=CODE (W$(N)(U TO U))
2260 LET Q=Q+128
2270 LET W$(N)(U TO U)=CHR$ (Q)
2275 PRINT AT Y-U,X-U;CHR$ (Q)
2277 PRINT AT N+4,22+U;CHR$ (Q)
2280 NEXT U
2290 LET NUTF=NUTF-1
2300 IF (Y+1)-LENGTH<1 THEN GOTO
     400
2320 LET Y=Y+1
2330 IF A$(Y-U,X)<>W$(N)(U TO U)
     THEN GOTO 400
2340 NEXT U
2348 FOR U=1 TO LENGTH
2350 LET Q=CODE (W$(N)(U TO U))
2360 LET Q=Q+128
2370 LET W$(N)(U TO U)=CHR$ (Q)
2375 PRINT AT Y-U,X;CHR$ (Q)
2377 PRINT AT N+4,22+U;CHR$ (Q)
2380 NEXT U
2390 LET NUTF=NUTF-1
2400 GOTO 400
2405 LET Y=Y+1

2410 LET X=X-1
2420 FOR U=1 TO LENGTH
2430 IF A$(Y-U,X+U)<>W$(N)(U TO U)
     THEN GOTO 400
2440 NEXT U
2445 FOR U=1 TO LENGTH
2450 LET Q=CODE (W$(N)(U TO U))
2460 LET Q=Q+128
2470 LET W$(N)(U TO U)=CHR$ (Q)
2475 PRINT AT Y-U,X+U;CHR$ (Q)
2477 PRINT AT N+4,22+U;CHR$ (Q)
2480 NEXT U
2485 LET NUTF=NUTF-1
2490 GOTO 400
2495 IF (X-1)+LENGTH>20 THEN GOT
     O 400
2510 LET X=X+1
2520 FOR U=1 TO LENGTH
2530 IF A$(Y,X+U)<>W$(N)(U TO U)
     THEN GOTO 400
2540 NEXT U
2545 FOR U=1 TO LENGTH
2550 LET Q=CODE (W$(N)(U TO U))
2555 LET Q=Q+128
2560 LET W$(N)(U TO U)=CHR$ (Q)
2570 PRINT AT Y,X+U;CHR$ (Q)
2577 PRINT AT N+4,22+U;CHR$ (Q)
2580 NEXT U
2590 LET NUTF=NUTF-1
2600 GOTO 400
2605 IF (X-1)+LENGTH>20 OR (Y-1)
     +LENGTH>20 THEN GOTO 400
2605 LET X=X+1
2610 LET Y=Y+1
2630 IF A$(Y+U,X+U)<>W$(N)(U TO U)
     THEN GOTO 400
2640 FOR U=1 TO LENGTH
2650 LET Q=CODE (W$(N)(U TO U))
2655 LET Q=Q+128
2660 LET W$(N)(U TO U)=CHR$ (Q)
2670 PRINT AT Y+U,X+U;CHR$ (Q)
2677 PRINT AT N+4,22+U;CHR$ (Q)
2680 NEXT U
2665 LET NUTF=NUTF-1
2670 GOTO 400
2680 PRINT AT 18,0,"WELL DONE. A
     NOTHER GO?
                    "
8010 PRINT AT 21,0,"
     "
8020 IF INKEY$="" THEN GOTO 8020
8030 IF INKEY$<>"Y" AND I
     NKEY$<>"N" THEN GOTO 8020
8040 IF INKEY$="N" THEN GOTO 804
8050 CLS
8060 STOP
9010 PRINT "   IN THIS GAME,YOU T
     YPE IN SOME"
9020 PRINT "WORDS (1-9) ALL OF T
     HE SAME"
9030 PRINT "LENGTH (2-9 LETTERS)
     .THE"
9040 PRINT "COMPUTER WILL THEN H
     IDE THEM"
9050 PRINT "IN A 15 BY 20 MATRIX
     JUMBLED UP"
9060 PRINT "WITH OTHER LETTERS.Y
     OU HAVE TO"
9070 PRINT "FIND THEM,AND TELL T
     HE COMPUTER"
9080 PRINT "THREE THINGS."
9090 PRINT "         A: THE COORDINATES
     OF THE"
9100 PRINT "         FIRST LETTER."
9110 PRINT "         B: THE DIRECTION OF
      THE WORD"
9120 PRINT "         C: THE NUMBER OF T
     HE WORD"
9130 PRINT "DIRECTION:      4 5 6"
9150 PRINT "                ***"
9160 PRINT "                3*#*7"
9170 PRINT "                ***"
9180 PRINT "                2 1 8"
9200 FOR S=1 TO 200
9210 NEXT S
9220 CLS
9300 RETURN
9900 SAVE "WORD SEARCH"
9999 GOTO 5
```

Illustration: Terry Rogers

```
10 CLEAR 0
11 IN. "INSTRUCTIONS(Y=1,
    2=NO)"V,IF V=1 G.300
15 B=32928
16 IN. "DIFFICULTY 1-6"F
17 CLEAR 0
18 IF F>6 G. 16
20 F. I=1 TO F,A=A.R.%32+33249
30 ?A=42
357B=64
36 ?B=102
37 ?B=64
38 IF ?(B+32)=42 G.100
39 IF B=32960 G. 200
40 N.
45 F.I=1 TO 6,WAIT,N.
50 P.$10#24
60 LET C=?#$001
70 IF C=127 THEN LET B=B+1
80 IF C=191 B=B-1
81 IF B<32928 B=32928
85 ?B=102
86 IF ?B+32=42 G.100
90 G.20
100 P. "YOU CRASHED"/LINK#FFE3/RUN
200 P.$12#7$7"YOU DID IT THE MINERS THANK YOU",E.
300 P. "FERRY"'"------"'''
310 P. " A MINING COLONY HAS BEEN SET "'"UP IN AN ASTEROID "
320 P. "FIELD IT"'''"IS YOUR JOB TO CONTROL THE "'
330 P. "ROBOT SHIPS THROUGH THE ASTEROID"'"FIELD TO SUPPLY "
340 P. "THEM"'"CTRL-LEFT"'"SHIFT-RIGHT"''
350 P. "Press any key to run"'LI. #FFE3,G.15
```

MINING COLONY

Out in the depths of darkest space there is an asteroid mining colony plundering the riches of the universe. The miners dig up minerals which are turned into products like solar powered washing machines back on Earth.

But the colony is running low on supplies. The robot ships are on their way — but an asteroid field blocks their flightpath. Your job is to act as an air traffic controller and guide the supply ships through the asteroids and down on to the planet.

The ships are controlled from Atom flight command by using the CTRL key to move left and the SHIFT key to move right.

RUNS ON AN UNEXPANDED

ACORN ATOM

BY ROBERT CAMPBELL

```
10 DATA 0,0,0,0,0,0,0,2
12 DATA 0,0,0,0,135,195,0
14 DATA 0,0,0,0,129,195,231,0
16 DATA 66,182,126,0,231,231,231,0
18 DATA 126,126,126,0,231,231,231,0
20 DATA 255,129,255,129,255,129,255,129
22 DATA 255,129,255,129,255,129,255,129
24 DATA 255,129,255,129,255,129,255,255
26 DATA 0,0,0,129,255,129,255,129
28 DATA 0,36,36,126,165,165,255,90
30 DATA 36,24,126,165,165,165,255,0
32 DATA 60,126,165,165,165,165,255,90
34 DATA 0,0,36,36,126,165,255,0
36 DATA 0,0,36,36,126,126,255,90
38 DATA 0,0,0,0,36,126,255,0
40 DATA 0,0,0,0,24,60,0,0
42 DATA 0,0,0,0,182,165,126,60
44 DATA 0,60,90,60,24,60,36,76
46 DATA 0,12,28,0,63,54,126,165
48 DATA 204,93,2,53,60,28,28,28
50 DATA 60,60,153,153,153,90,60,0
60 DRAMSIZE 17:POKE 756,48
62 COLOR 136=PLOT 8,0=DRAWTO 39,0:POSITION 0,2:PRINT #6;"SCORE "10
64 SETCOLOR 0,1,8:SETCOLOR 1,0,14:SETCOLOR 2,3,4:SETCOLOR 3,6,8:SETCOLOR 4,14,2
66 GOSUB 280:IF H=H0 THEN GOTO 1100
70 GOTO 200
80 COLOR 14:RESTORE 1024:A=A:PEEK(57344+A):NEXT A
90 FOR A=0 TO 127:IF A<>8 THEN POKE 1024+A,B:NEXT A
92 FOR A=0 TO 55:READ B:POKE 1664+A,B:NEXT A
94 DIM G=(15):B=(15),C=(15),D=(15),E=(15),H=(15),I=(15)
96 B(7)=(16,(1)+=(16)(1))+=(13)+=(17)+(2)=(15)+(16)=(1)=(17)=(42)(C(13)+60
98 B(7)=(16,(1)+=(2)=(16)(1))+=(18)(13)+=(1)(17)+=(42)(C(13)+8(7)=88
100 DRAWSIZE 17:POKE 756,48
102 COLOR 136:PLOT 8,0=CARCOLOR 17:PLOT B,0=(1)C=0(1
104 LOCATE B,8=A1;IF F<96 THEN 380
270 IF F=A AND RND(1)<0.65 THEN COLOR 135:PLOT B,A:GOTO 260
280 IF F=A THEN COLOR 134:PLOT B,A=COLOR 133
290 B=B+(1)(1(1)):B=R:GOTO 380
300 COLOR 135:PLOT B,A:FOR G=1 TO 5
310 RESTORE 58:B=INT(RND(1)+13)+INT(RND(1)+5)+1
320 FOR B=1 TO 1:COLOR B=(G),B,F1:F F(1)2 THEN PDP F(1)32
335 NEXT B1
340 COLOR 136:PLOT B,0=COLOR 133:PLOT B,0+1
350 LOCATE B,8=(1):IF F<96 OR (F=A AND RND(1)<0.65) THEN COLOR 135:PLOT B,A:GOLO
A 133:GOTO 380
360 IF F=A THEN COLOR 134:PLOT B:COLOR 133
370 G=G+1:PLOT B,0:GOTO 350
380 NEXT A:RETURN
390 COLOR 18:PLOT D(1),E(1):COLOR 88:PLOT X,Y
400 FOR B=1 TO F:IF D(B)==0 THEN 50
410 IF 1(B)=1 THEN THEN D(B)(1):IF D(B)<0 THEN F=F(B)(B)=D(B)+E(B)+E(B):GOTO 420
418 D(B)=D(B)+1(1):E(B)=E(B)+1,FILCOLR D(B),E(B)=0
442-27 B=169 THEN F E(B)=E(B)+G(B)+B:D(B)=D(B)+(D(B)0+H(B)0)=GOT
A 450
458 IF F<=2 THEN E(B)=E(B)(1(1)B)=1(B(1)0):GOTO 460
```

Wild Strawberries

You won't get a chance to pick your own when the Wild Strawberries get on your trail. This bunch of furious fruits are not the sort to be covered in cream and devoured. They roam the vegetable patch in search of unwary gardeners — who will come to a sticky end.

You use your Atari joystick to guide your workman around the different levels of a garden on a network of ladders and pathways. The gardener has to eliminate the rampaging strawberries by quickly digging a pit to trap the advancing fruit.

RUNS ON AN ATARI 400
IN 16K WITH JOY STICKS
BY STEVEN PERKINS

The strawberries fall into the pit — but there's a big snag. The strawberries will only stay trapped for a few seconds — and to finish them off the gardener must push them through the holes so they will fall to the bottom level of the garden and find themselves in a real jam!

Each new frame provides a different network of ladders and paths and more strawberries. The game gets harder and harder as you become more skilled at picking off the deadly fruit. You'll eventually come across a really tough breed of strawberry which can only be killed by pushing from a greater height. Strawberries and cream will never be the same!

```
455 IF F<4 THEN COLOR 6:PLOT D(B),C(B)+1
460 COLOR (6B+D)/DT D(B),C(B):COLOR H(B):PLOT D(B)-F(B),C(B)+G(B)
470 H(B)=D:IF P<>B(B) AND Y<E(B) THEN 980
480 IF Q<135 THEN AN(NT(RND(1)*(N+1)))+F(B)=(A)+1+(A)=0(B):A=3A(B):GOTO 510
490 IF Q<135 THEN AN(NT(RND(1)*(N+1)))+F(B)=(A)+1+(A)=0(B):A=3A(B):GOTO 510
500 IF Q<135 THEN AN(NT(RND(1)*(N+1)))+F(B)=(A)+1+(A)=0(B):A=3A(B):GOTO 510
510 NEXT B:GOTO U
620 B=STICK(A):IF STRIG(0)=0 THEN 590
610 F=F(B):G=G(B):D=D+F:Y=Y+3:IF X<3 THEN 2*F
620 IF F=0 AND G=0 THEN 400
630 IF X AD OR X<3 THEN X=F:GOTO 620
640 LOCATE X,Y:IF X<3 AND 6<>0 OR AN<63 THEN X=X-F:Y=Y-G:GOTO 400
650 SOUND 1,150,10,12:COLOR C(E):PLOT X,Y:COLOR 9:PLOT X-F,Y-G:H=C
660 H=G:LOCATE X,Y+1:IF A=2 OR A=32 THEN 1050
670 SOUND 1,0,0:GOTO 400
700 LOCATE X=1,Y=1,A:IF A=185 THEN 380
710 IF A=6 OR A=32 THEN 950
720 LOCATE X=1,Y:IF X=13 THEN 480
730 COLOR C(H):PLOT X,Y+1:COLOR 2:198=15:15:25:FOR D=1 TO 10:NEXT D
740 COLOR 159:PLOT X,Y:COLOR 0=1:PLOT X,Y+1:RETURN
750 IF RND(1)<0.2 THEN 770
760 COLOR 159:E(B)=E(R)-1:PLOT D(B),E(B):COLOR A:PLOT D(B),E(B)+1:I(B)=Q(B)B:B=A
770 COLOR 178:PLOT D(B),E(B):SOUND 3,0,6,10:PLOT B CH=1 TO 10:NEXT C
780 COLOR 169:PLOT D(B),E(B):SOUND 3,0,6,0:GOTO 510
800 COLOR J:B=B-1:COLOR 176:PLOT X,Y+6OSUB 890:NEXT A
810 FOR A=0 TO 9:SOUND J,120-A:6,A,15-A=0:COLOR 172:PLOT X,Y:GOSUB 890:NEXT A
820 SOUND 3,0,0,0:COLOR 6:PLOT X,Y:GOSUB 890
830 CH=F:F PH=1 THEN 1013
840 Q=H:Q=H:Q=R:Q=FT(PH+1)H/H
850 ? H6:Y=3:FOR D=1 TO 3:NEXT D
850 ? H6:"+":POSITION 6,8:? H6:"+SCORE "19:COLOR 7:PLOT 1,0:H4NTD H,B:GOSUB 200
870 FOR D=1 TO 3:RESTORE 56:0=INT(RND(1)*5)+1:FOR D=1 TO 3:READ SH:NEXT CH(A):0=1
H:N=32
880 FOR D=1 TO 3:NEXT D:NEXT RETURN
900 FOR A=1 TO F:IF D(A)=X AND E(A)=Y THEN 902
901 NEXT F
905 IF (F)=0 THEN U00
910 SOUND 3,50,10,15:COLOR C(H)=1:PLOT X,Y:FOR B=1 TO 20:NEXT B
920 COLOR C(H):PLOT X,Y:D=M:A>Y:B=X:FOR A=1 TO 3:SOUND 3,10-A,8,15
930 LOCATE X,Y+1:IF C 46 THEN 924
940 C=0 THEN 0=4
950 COLOR 159:PLOT C,Y+0:COLOR 0:PLOT X,Y+0=1 TO 10:NEXT Y:BYHE
955 NEXT B
960 IF B<2 THEN 1032
970 SH=9+18:CH=1:COLOR 186:PLOT C,Y+9
980 FOR D=250 TO .-STEP -10:SOUND 3,D,6,15:NEXT E:SOUND 3,0,0,0
990 COLOR 6:PLOT C,Y+9:IF F<>0 JN:POSITION 8,9:PRINT H6:"SCORE "18
1000 IF Q=F THEN F>4=19TO 928
1010 GOTO U00
1020 SOUND 3,0,0,0:IF F<>0(F)F=C(F)(F):IF 6=96 OR 2=133 OR 0=169 OR DT8
1030 ? H6:"+":POSITION 9,1 TO 22:COLOR 59:LOCATE X,Y+1:EI:IF 6=96 OR 2=133 OR 0=169 OR DT0
1040 ?+Y+Y=1:P:Y,6:COLOR 6:PLOT X,Y=1:GOSUB 1:AB=Y+6:16:16:18:GOSUB 1000
1070 SOUND 1,0,0,0:IF F<>0 THEN 1050
1090 IF B=H1 THEN H6
1092 R=159:N=RH:R=R3R2
1100 +=122(A=99)(GOTO 1170:POSITION 0,8:PRINT "H6:" WILD STRAWBERRIES "+GOSUB 1200
1110 POSITION 0,8:PRINT H6:" BY 9 J PERKINS "+GOSUB 1200
1120 POSITION 0,8:PRINT H6:" HI SCORE "(INT(HI))+GOSUB 1200
1130 POSITION 0,8:PRINT H6:" PRESS TRIG TO START "+GOSUB 1200:GOTO 1100
1160 FOR C=0 TO 25:IF STRIG(0)=0 THEN 0=0:H=H1:L=1.8E-03:GOTO 82
1210 NEXT D:RETURN
1220 RETURN
```

Illustration: Dorian Cross

KAMIKAZE

Some aliens just don't care. They'll hurl themselves out of their spaceships and hurtle down at you with no regard for life or limb. They smash into the ground and explode violently sending earthquake strength shockwaves rumbling out around them.

You have to dodge the explosions and at the same time destroy aliens by catching them as they drop from their mothership in a continuous stream.

You can send the ugly aliens back where they came from if you manage to destroy enough of them. But if you fail the mothership will land and colonise your planet.

You have three lives to do battle with the aliens and the explosions generated by the falling hoardes increases proportionally with the level of difficulty you choose.

Your base is controlled by using the 'Z' key to move left and '?' to move right.

Can you save the earth? Ooops, there goes another one . . .

RUNS ON A 40 COLUMN PET IN 6K
BY ROBERT CASTLE

```
1 KM8
2 REM***COPYRIGHT R.CASTLE 16.7.82***
3 PRINT"J":H$=CHR$(32)PT$=H$+H$:PH$=CHR$(29)?U$+H$:H$(40):2H$    :00T0100B8
5 CR$)=U#)
6 CR$)=U#)
10 PRINT"J":X=32797?U#)?H$(32)?X=32928+(U#40)&U$(40)
7 PRINT"J"
10 PRINT"U"
100 POKE9,160:POKE-1,233:POKE9,160:POKE1,223
100 PRINT"                                           SCORE /Z"BASES /CR"LEVEL /U"H
ION"#K
105 POKE2,90:POKE-1,90:POKE1,90:POKE-2,90:POKE2,90:POKE9,90:POKE-9,90
106 POKE6,90:POKE-6,90:POKE6,90:POKE-6,90:POKE9,90:POKE-9,90:POKE9,90
107 POKE12,90:POKE-12,90:POKE12,90:POKE-12,90:POKE9,90:POKE-9,90:POKE9,90
108 POKE38,90:POKE-38,90:POKE1,90:POKE-1,90:POKE37,90:POKE-37,90:POKE31,90:POKE12,90
110 POKE40,160:POKE41,160:POKE39,160:POKE39,160:POKE32,160:POKE32,160:POKE39,160
111 POKE43,160:POKE44,160:POKE42,160:POKE37,160:POKE35,160:POKE36,160:POKE14,160
112 POKE54,160:POKE55,160:POKE-47,160:POKE35,160:POKE45,160:POKE43,160:POKE9,160
113 POKE47,160:POKE43,160:POKE-33,160:POKE47,160:POKE-43,160:POKE33,160:POKE29,160
114 POKE9,160:POKE-9,160:POKE9,160:POKE9,160:POKE-9,160:POKE9,160:POKE9,160
115 POKE29,160:POKE-29,160:POKE29,160:POKE29,160:POKE-29,160:POKE29,160:POKE29,160
116 POKE60,160:POKE-69,160:POKE78,160:POKE-72,160:POKE9,160:POKE-9,160:POKE78,160
117 POKE69,160:POKE-60,160:POKE72,160:POKE-78,160:POKE9,160:POKE-9,160:POKE60,160
118 POKE9,209:POKE-9,209:POKE72,209:POKE-78,209:POKE9,209:POKE-9,209:POKE9,209
119 POKE9,209:POKE-9,209:POKE9,209:POKE9,209:POKE9,160:POKE-9,160:POKE9,160
120 POKE9,209:POKE-9,209:POKE9,209:POKE9,209:POKE9,209:POKE9,160:94,160
121 POKE60,160:POKE-9,160:POKE9,160:POKE9,160:POKE9,160:POKE9,160:96,90
122 POKE109,160:POKE-9,160:POKE107,160:POKE9,160:POKE9,109:POKE-9,109:POKE110,160
123 POKE109,160:POKE-9,160:POKE117,160:POKE9,160:POKE9,109:POKE-9,109:POKE110,160
125 POKE9,160:POKE-9,160:POKE9,160:POKE9,160:POKE9,160:POKE-9,160:POKE107,160
126 POKE9,160:POKE-9,160:POKE9,160:POKE9,160:POKE9,160:POKE-9,160:POKE107,160
127 POKE9,160:POKE-9,160:POKE9,160:POKE9,160:POKE131,160:POKE-9,160:POKE107,160
128 POKE9,160:POKE-9,160:POKE9,160:POKE9,160:POKE9,160:POKE-9,160:POKE107,160
129 POKE9,160:POKE-9,160:POKE9,160:POKE9,160:POKE9,160:POKE-9,160:POKE103,160
130 POKE9,160:POKE-9,160:POKE9,160:POKE9,160:POKE9,160:POKE-9,160:POKE103,160
132 POKE211,160:POKE-213,160:POKE9,160:POKE213,160:POKE9,209:POKE-9,160
133 POKE197,160:POKE-197,160:POKE168,160:POKE163,160:POKE191,160:POKE-197,160
140 POKE103,160:POKE-9,160:POKE9,160:POKE9,160:POKE209,209:POKE-209,209:POKE231,160
142 POKE229,160:POKE-203,160:POKE237,160:POKE237,209:POKE-209,209:POKE231,160
143 POKE203,209:POKE-203,209:POKE237,209:POKE9,209:POKE-9,209:POKE231,160
145 POKE203,160:POKE-203,160:POKE267,160:POKE9,160:POKE9,160:POKE271,160
147 POKE267,160:POKE-203,160:POKE237,160:POKE237,160:POKE231,160:POKE-203,160
148 POKE265,226:POKE-265,226:POKE267,160:POKE9,160:POKE9,160:POKE226,160
167 POKE307,226:POKE-309,226:POKE9,160:POKE311,226:POKE9,333,226
168 POKE305,226:POKE-323,226:POKE9,226:POKE225,226:POKE9,226:POKE-329,226:POKE321,226
169 POKE323,226:POKE-329,226:POKE9,226:POKE327,226:POKE9,226:POKE329,226:POKE331,226
210 B$=((FPEEK(2)+40)+X0)POKE9!X+400=180   THEN700:E$="
211 POKE9,160:POKE-1,223:POKE9T,160:229
220 IF     C>32B (327677HEN)700
221 B$=INT(19#RND(1))
222 IFB$=0THEN225
223 IFB$<>0AND(B$>B$)=231
224 POKE9,216:POKE9,160:POKE9,160:POKE9,160:POKE-2,32
240 POKE151,30
250 GETX$:IFX$<>""THEN270
260 IFX$="Z"THEN500
265 IFX$="?"THEN600
270 NEXTB
```

COMPUTER & VIDEO GAMES 45

ingenious!
Genie I and II accessories

PRINTERS
The EG 3085 is quiet, fast and efficient. Printspeed is 100 characters per second and printing is bi-directional at 80 or 136 characters per line. Suitable for use with other systems, it has three typestyles, adjustable pin or friction feed and single sheet or roll paper facilities. **£425 plus VAT.**

If you don't want to pay that much for a printer, consider the EG 603. It doesn't match the EG 3085 in certain areas, but you will still get 100 c.p.s. bi-directional, a range of character styles, forward and reverse feed and pin/friction feed, with 96 characters and 64 graphic patterns. **£235 plus VAT.**

MONITORS
Available in 9″ and 12″ sizes, with white, green or amber display, Lowe A.V.T. monitors are sturdy, attractive, easy to operate and feature an easy view screen with smoked anti-glare display filter. Compatible with most popular micros on the market. **From £75 plus VAT.**

EQUIPMENT COVERS
Beat the dirt, coffee spills and sticky fingers when your computer and monitor are not in use with these top quality black leather covers.

Genie CV1 £5 plus VAT.
12″ monitors CV6 £6.20 plus VAT.
9″ monitors CV3 £4.20 plus VAT.

DISK DRIVES
If you want fast, reliable program storage, true random access file handling and access to many computer languages, we can meet your needs. The EG 400T provides storage of up to 184320 bytes per floppy disk and comes complete and tested, in a stylish colour matched cabinet. **£220 plus VAT.**

The EG 401 AT offers dual disk drive with 368640 bytes of useable storage and comes complete with a power supply ready to connect to an expander box. **£365 plus VAT.**

DOUBLE DENSITY ADAPTOR
Allows the use of standard minidisk drives in double density, with virtually double the storage capacity. The EG 3021 is equally at home in the Genie or TRS-80 expander boxes.

A double density disk operating system will be needed, such as smallDOS provides. **£72 plus VAT.**

EXPANDER BOX
The updated EG 3014 expander box allows for up to four disk drives with optional double density. It connects to a printer, an RS 232 interface, or 5100 cards. Not bad value at **£190 plus VAT (16K version)** or **£200 plus VAT (32K version)**

*The EG 3014 will work with TRS 80 by using the EG 3023 Tandy Adaptor.

TECHNICAL MANUALS
Full technical details of Genie Hardware (all you ever wanted to know about Genie).

Genie I/II Technical Manual
£69 plus VAT.
Expander and accessories (EG3014)
£10 - No VAT.

smallDOS
Powerful, yet reasonably priced, the Genie smallDOS contains 21 library commands, 7 utilities, LBASIC, disk basic and bags of information, including a reference manual and 40 page beginners guide to disk usage. **£35 plus VAT.**

HIGH RESOLUTION GRAPHICS
Increase graphic resolution capabilities on your Genie seventy-three fold with the LE18 HI-RES unit. It offers bit image graphics of 73,728 points, a resolution of 384 x 192, and uses a separate 16K of video memory to achieve its resolution. Graphics are intermixable with text or existing pixter graphics, and animation, reverse video displays and use of programmable graphic characters are possible. **£86 plus VAT.**

GENIE MONITORS
Two good performance, low priced 12″ monitors, either to match your Genie or compatible with a wide range of other systems. Good resolution and band width and, of course, they free your television set for the other type of programmes you like to watch!

The EG 100 12″ in black & white costs **£69 plus VAT.**

The EG 101 12″ with green phosphor is **£79 plus VAT.**

Illustration: Dorian Cross

```
275 POKE8,32:POKER-1,32:POKER-2,32
280 POKE8,80
285 FORD=1TO30
290 B=B+40:POKER+1=16THEN1080
300 IFPEEK(B+40)=16THEN1080
305 POKEB-1,20
310 GETI$:IFI$=" "THEN330
315 IFI$="Z"THEN50#
320 IFI$="M"THEN650
325 NEXTI
330 POKEB,32
335 GOTO210
500 R=R+1:POKER-2,32:POKER,160:POKER+1,223:POKER-1,223:GOTO270
505 IFR=33608THEN270
550 R=R-1:POKER-2,32:POKER,160:POKER+1,223:POKER-1,223:GOTO330
555 R=R+1:POKER-2,32:POKER,160:POKER+1,223:POKER-1,223:GOTO336
600 IFR=33647THEN270
605 R=R+1:POKER-2,32:POKER,160:POKER+1,223:POKER-1,223:GOTO336
650 R=R-1:POKER-2,32:POKER,160:POKER+1,223:POKER-1,223:GOTO330
700 IFR=33647THEN270
750 FF=R-40:POKEFF-34:POKER,160:POKER+1,223:POKER-1,223
760 FF=FF+40:POKEFF+40,32:POKEFF,74
765 IFPEEK(FF-40)=96THEN800
770 IFPEEK(FF-40)=96THEN1350
775 NEXT
780 POKEF,32:POKEFF-40,32:GOTO330
800 POKEB,32:POKEB-40,32:POKER+1,32:POKER+1,32
815 POKER,42:POKER-40,32:POKER-1,42:POKER+1,42
840 NEXTI
848 GOTO7
1000 REM***MARTIAN GROUND EXPLOSION***
1015 CC=B  :DD=B
1016 FORF=1TOW
1018 IFPEEK(CC+1)=160ORPEEK(CD-1)=16THEN1100
1019 IFPEEK(CC+1)=223ORPEEK(CD-1)=223THEN1100
1020 IFPEEK(CC+1)=223ORPEEK(CD-1)=223THEN1100
1025 POKECC,42:POKEDD,42
1040 CC=CC+1:DD=DD-1
1045 NEXTI
1050 W=33600
1060 FORI=1TO40:POKEW,32:W=W+1:NEXTD
1065 C=C+40:W=W+40:GOTO110
1070 FORI=1TO10
1105 POKER,32:POKER-40,32:POKER-1,42:POKER+1,42
1106 POKER,42:POKER-40,42:POKER-1,42:POKER+1,42
1110 NEXTI
1120 CR=CR-1:KK=KK+40:CC=C3:IFCR=8THEN1200
1140 GOTO110
1200 PRINT"YOU GOT BLOWN UP EARTHLING"
1230 PRINT"YOU SCORED "Z2" POINTS"
1240 PRINT"THE EARTH IS NOW OVERRUN WITH MARTIANS"
1240 IFZ=K THEN1250
1245 PRINT"HIGH SCORE IS STILL "H" POINTS"
1246 FORI=1TO2900:NEXTI:GOTO2
1250 PRINT"PRINT" WOW HIGHEST SCORE TODAY!"
1255 K=Z
1260 FORI=1TO2500:NEXTI:GOTO3
1290 POKEF,32:GOTO330
1300 POKER,74:GOTO330
1310 FORI=1TO1500:NEXTI,J
1510 PRINT"#"
1520 PRINT"#  ALL EARTHLINGS WILL BE SLAVES TO THE"
1530 PRINT"#  MARTIAN MASTER RACE......"
1540 PRINT"#  YOU SCORED "Z2" POINTS":GOTO1240
1550 A=C+346 :B=C+344:C=C+374
1560 FORI=1TO2
1570 POKER-40,32:POKER,77
1575 A=A+39:B=B+40:C=C+41
1585 FORF=1TO250:NEXTF
1590 POKEA,105
1595 POKEB,105
1600 POKEC,105
1601 POKER-40,32:B=B+40:NEXTR
1602 NEXTR:FORF=1TO10:NEXT
1603 B=B+160
1604 FORF=1TO4:FORM=1TO250:NEXTR
1606 POKEB-40,67:POKEB+39,88:B=B+40:NEXTI
1615 PRINT"#"
1620 GOTO1505
1700 PRINT"#YOU HAVE BEATEN THE MARTIANS,RECEIVE"
1710 PRINT"#PRINT"#A BONUS OF 250 POINTS AND TRY TO STOP"
1715 PRINT"#PRINT"#THE NEXT ATTACK FROM REACHING EARTH"
1717 IFH=HTHEN1730
1720 Z2=Z2+250:TS="#A#"#H33627:A=32920+(W+40):H=H+1
1740 POKEL,Q1990:NEXTL:GOTO110
1800 PRINT"#########,##########      ##"
1810 PRINT"#  #  #  #  #  #      ##"
1820 PRINT"#  #  #  #  #  #      ##"
1830 PRINT"#  #  #  #  #  #      ##"
1840 PRINT"#  #  #  #  #  #      ##"
1850 PRINT"#    #    #    HIGHEST SCORE TODAY IS "H
1870 PRINT"#      PRESS ANY KEY THEN RETURN"
1900 PRINT"#"
1905 PRINT"#"
1950 PRINT"#IF THE MARTIAN SPACESHIP FROM"
1955 PRINT"#PRINT"#REACHING EARTH,KAMIKAZE MARTIANS"
1960 PRINT"#PRINT"#WILL DROP FROM THE SHIP AND TRY AND"
1965 PRINT"#PRINT"#TO DIRECTLY VOLLANICH OUT FOR THEIR EXPLOSION."
1966 PRINT"#PRINT"#POINTS AND THE SPACESHIP MOVES UP,WHEN A"
1967 PRINT"#PRINT"#MARTIAN LANDS IT MOVES DOWN,TO GET THE"
1968 PRINT"#PRINT"#250 POINT BONUS MOVE THE SPACESHIP OFF"
1969 PRINT"#PRINT"#THE RIGHT OF THE SCREEN,PRESS THE SPACE"
1970 PRINT"#PRINT"#BAR TO FIRE,Z TO GO LEFT,M TO GO RIGHT,"
1975 PRINT"#PRINT"#THE LEVEL OF DIFFICULTY GIVES A BONUS"
1976 PRINT"#PRINT"#PRESS ANY KEY THEN RETURN"
1978 PRINT"#":GOTOS
1979 PRINT"#PRINT"#YOU HAVE REACHED THE TOP BONUS STAGE."
2010 PRINT"#PRINT"#RECEIVE AN EXTRA 1000 POINTS AND START"
2015 PRINT"#PRINT"#AGAIN AT LEVEL ":H:H+1000:Z2=Z2+1000:GOTO1730
```

GALAXIAN COLONY II

Message to Earth Defence Command. Priority One. A new breed of Galaxians are invading earthspace. It appears they are attempting to colonise this planet. They must be stopped at all costs. Alert defence forces immediately.

The only way pilots can destroy these aliens is to collide with them. But our intelligence service reports that these aliens transform at random into construction units on entering earth's atmosphere — collision with an alien after it has transformed will prove fatal.

These aliens must not be allowed to penetrate earth defences. The outcome of a landing by even one of the attacking force could be disasterous for mankind. I repeat — they must be stopped at all costs . . .


```
5  GOSUB 10000
10 K = 161 ROT= 0: HCOLOR= 3: X1= HOME I9 = SI5T = 350I: GOSUB 8040
15  HCOLOR= 5H
20  FOR I = 0 TO 15F STEP 3
30  HPLOT  : INT ( RND (1) * 2901*P
40  NEXT I
100 DIM A(350)I: DEF  FN B(K)=  INT ((((X - 5) / 11) * 24) + (X - 5) / 11))I DEF  FN M(A) =  INT
    ((((X - 5) / 11) * 24) + ((X - 5) / 11))
110 DEF  FN N(K)=  INT (((((X - 5) / 11) * 24) + ((X - 5) / 11))
```

```
100 GOSUB 5001 FOR P = 1 TO 3501MP) = 0I NEXT P                    "1 NORMAL I POKE - I
110 X = 51T = I  INT ( RND (1) * 4 )+1 I I1 Y I5
115 HCOLOR= 5H                                      HIT ANY KEY TO START
120 FOR J = 0 TO 15F STEP 3I PRINT       SCORE=Y+5
125 HOME : Y = -1A30A=I328
130 WGHI = XI TAB ( J )+13 INT                    HOME AT X(M) XDRAW AT K(M) XDRAW FM N(M)AM FM
135 HOME X XTAB (23) I9000
130 FOR T = 0I TR) = AV(5 ) X( DR (N )( X D (N I0 X 3 50 )) THEN  ROT= 0I XDRAW AT K(M) XDRAW FM N(M)AM FM
135 I9 (I * 7) * TR) AN9 (IN ( K) DR (N )0 3 500
```

Illustration / Duncan Groves

```
90 N(K) = K : GOSUB 5001 IF (S ) S1
) (RF ( - 1 ) * 163B4 )
130 K = K + 1 : GOTO 7000
140 V = 217 THEN Y = Y + 11
150 IF X = 194 THEN Y = Y - 11
160 IF Y ) 5 THEN Y = Y + L
170 IF Y ) 148 THEN Y = L
170 X = X + 11
180 IF X ) 269 THEN X = S
180 ROT= 0
190 QX = X(Q) : XDRAW 7 AT QX+Q1 XDRAW 7 AT X+Y
190 OX = X(Q) : Y
220 IF ( Y = H ) K ( T = H ) THEN : GOSUB 600
230 IF AF ( 1 THEN RETURN
230 NEXT Q
250 IF AF ( 1 THEN RETURN
250 ROT= 130
```

```
510 A ( = INT ( RND (1) * 24) K 11 ) + SIM = ( INT ( RND (1) * 24) K 11 ) + 51 IF AL = 1 THEN AL = QIAL + AL ( 11 IF AL = 1 THEN
530 IF AK = 5 THEN AK = QIAL + AL ( 11 IF AL = 1 THEN
540 ROT= 01 XDRAW AL AT N+H1 ROT= K1H1 FN H(K) = 1
540 ( INT ( RND (1) X 3 ) K RL) X 9 = Y
570 RETURN
540 ROT= BIS = S + L0 (7 - AL)1 XDRAW AL AT N+H1 PRINT CHRN (7)1(AK = AK + 11 GOSUB 5001 ROT= R
5) STAB
590 VTAB ( 21 )1 HTAB (22)1 PRINT S1
```

```
5002 REM
5003 FOR P = 0 TO 150 STEP 8
5010 FOR N = 0 TO 1X XDRAW 1 AT QX+QY
510 + ( RFE ( - 16336)
5025 NEXT P
5025 NEXT 16A
```

```
5040 TEXT : HOME : PRINT "SCORE" *S1 FOR P = 1 TO 5001 NEXT P1 POKE - 16368+0
5050 PRINT ( FLASH ( PRINT "DO YOU WANT TO PLAY AGAIN"?1 GET Z1N
5060 NORMAL
5070 IF ( = "Y" THEN ( CLEAR : GOTO 10
5070 TEXT : HOME : END
5000 FOR ( = 1 TO 101BF = PEEK ( - 16336) - PEEK ( - 16336)1 NEXT P
5005 N ( INT ( RND (1) K 21 ) X 51) + 51 INT ( RND (2) K 11 ) X 51
7010 N = INT ( RND (1) K 11 )
7010 IF H ( 1 THEN 7010
7020 IF X ( 1 = AK THEN 01 ROT= 01 XDRAW 1 AT QA+0R
7020 IF X = X(Q)
7020 QA = A(0) = 01 ROT= 01 XDRAW 1 AT QA+0R
7025 ON ( A=0 ) + 1 GOTO 7110
7020 IF ( = H ) THEN ( IKT (T / A)1
7050 IF ( A ) THEN ROT= 0 + 11
7050 IF ( IKT ( A ) ) = A THEN BV = 11
7050 IF ( = H ) X ( IKT ( A ) ) = A THEN BV = 11
7060 IF T = 0 THEN BV = 0
7050 IF T ) S THEN BV = 1
7070 IF ( = S ) THEN BV = 0
7070 IF A = B K AV=0 = B K BV
7020 REM
7090 FOR I = S THEN N = LL
7095 IF F ) 148 THEN B = S
7095 IF F ) S THEN F = S
7090 IF A ) 269 THEN A = 269
7090 IF A = 0 THEN A = S
7090 IF A ) 269 THEN A = S
7099 IF ( N = A ) ( ) 0 THEN BV = - BVIAV = - AV1 GOTO 7080
7100 ROT= 01 XDRAW 1 AT QA+0B1 XDRAW 1 AT A+B
```

```
7110 GOSUB 135
7115 IF (X = A) AND (Y = B) THEN GOTO 5000
7125 IF (X = A) AND (Y = B) THEN GOTO 5000
7130 OA = AIGH + B
7140 GOTO 7032
7750 TEXT : HOME
8005 FLASH : PRINT "SELECT SCREEN FORMAT:": NORMAL : PRINT : PRINT
8020 INVERSE : PRINT "DO YOU WANT THE SCREEN EXPANDED.YOU
8030 PRINT : NORMAL : PRINT "HORIZONTALLY THE SCREEN IS EXPANDED.YOU
WILL ALWAYS TRAVEL FROM LEFT TO RIGHT         ACROSS THE SCREEN.";P
8035  INVERSE                                       VERTICALLY?";I: NORMAL : GET EN
8040 HGR
8050 IF EN = "Y" THEN HCOLOR= 7: HPLOT 0,01 CALL 6245415H = 0
```

```
8060 IF EN = "Y" THEN UL = 14BILL = 5: GOTO 8675
8070 UL = SILL = 148I   HCOLOR= 7: HPLOT 0,0 TO 279,159
8I HPLOT 0,159 TO 279,159
8075 IF IA = "N" THEN SM = 7
8080 RETURN
8081 HGRI : POKE 232,161 POKE 233,64
10000 HGRI
10005 SCALE= 1
10010 SCALE= 1I ROT= 0
10020 FOR X = 16400 TO 16633
10030 READ X,Y
10040 READ X,Y
10050 NEXT X
```

```
10060 DATA 9+0+20+0+51+0+76+0+97+0+120+0+141+0+170+0+203+0+209+0
10070 DATA 62+54+13+34+45+9+60+63+36+45+64+60+23+3+28+54+53+63+36+23+39+39+55+14+14+49+63+55+13+4
1+0
10080 DATA 44+44+56+45+53+59+18+30+36+60+22+35+60+22+26+60+26+20+35+39+9+42+44+44+0
10090 DATA 54+33+45+9+33+60+55+63+63+60+54+63+60+55+46+9+41+46+0
10100 DATA 46+37+37+37+21+26+26+26+55+41+54+35+17+60+46+37+31+36+44+36+0
10110 DATA 44+62+44+7+33+60+39+37+39+55+63+60+54+46+62+19+35+44+36+4+0
10120 DATA 34+30+14+14+4+84+39+42+13+60+15+18+39+39+23+54+22+59+60+12+12+63+39+9+60+12+45+0
10130 DATA 49+19+53+21+9+60+46+46+36+37+37+31+26+36+60+36+39+23+36+50+54+62+39+39+55+23+10+49+53+23+2
7+44+60+0
10140 DATA 63+15+9+9+63+0
10150 DATA 18+44+49+44+37+37+44+36+39+60+60+39+63+62+55+55+62+54+53+46+44+53+5+0
10154 TEXT : HOME
10170 PRINT "*******************************************
10340 PRINT "*#I FLASH : PRINT "           GALAXIAN COLONY 3" CHR$ (9)1%         "*I NORMAL I P
RINT "*"I
10170 PRINT "*******************************************
10180 PRINT
10190 FLASH : PRINT "DO YOU WANT INSTRUCTIONS"*I GET ZZ%
10200 IF ZZ = "N" THEN RETURN
10210 TEXT : HOME
10220 NORMAL
10230 PRINT "               INSTRUCTIONS."
10240 PRINT
10240 PRINT "A NEW BREED OF GALAXIANS ARE INVADING  EARTHSPACE."
10250 PRINT "YOU AS A QUALIFIED STAR PILOT MUST      PREVENT THIS FROM HAPPENING."
10260 PRINT : PRINT "THE ALIENS APPEAR AND AFTER A RANDOM   PERIOD WILL TURN INTO ALIEN CONSTRUCT
IONKMKTS.COLLISION WITH THESE AR
E FATA."
10270 PRINT "TO KILL AN ALIEN YOU MUST COLLIDE WITH  HIM."
10280 PRINT
10290 PRINT "   KEY      DIRECTION"
10300 PRINT "    Y        UP"
10310 PRINT "    I        DOWN"
10320 PRINT "    Y        LEVEL FLIGHT"
10330 PRINT "OTHER KEYS   LEVEL FLIGHT"
10335 PRINT " IF YOU CLEAR TWO TRACKS OF ALIENS  THE FIRST ONE TO ESCAPE THEREAFTER WILL    RETUR
N WITH A GALAXIAN ESCORT."
10340 FLASH : PRINT "HIT ANY KEY TO CONTINUE"I GET ZZ%
10350 NORMAL I RETURN
```

BRICKBLASTER

"When I was very young I used to take great delight in bashing bricks all over the place — but after hitting myself on the head with the wrong end of a claw hammer I decided to stop. But now I can pursue old habits without putting myself in any danger thanks to my VIC-20!" So says Shaun Southern, author of this fast moving program.

At the bottom of the screen produced by your VIC you will see a demon brick-layer, cementing bricks as fast as he can. In fact he goes faster all the time. The rows of bricks will rapidly fill the screen unless you can halt his progress.

You are in control of a small craft at the top of the screen which whizzes back and forth almost as fast as the bricklayer. You have to drop bombs on the wall to knock holes in it — it's as simple as that! The bombs are fired by the f7 key — the only control in the game.

Shaun has provided some tips on getting a high score. His is 218. He advises you to aim for the cracks in the wall as this scores more points. The ends of the wall should be cleared first — as this is a difficult thing to do later in the game.

The game ends when your craft collides with a brick and your score and the highest score will be displayed.

So if you don't feel like becoming another brick in the wall — get blasting!

```
10 REM *** INITIALISATION ***
11 POKE36878,15:S1=36876:S2=36877:DIMX$(1)
12 X$(0)="█████":XX$(1)="█████"
13 REM *** RESET VARIABLES ***
15 GOSUB46:POKE36879,93:P1=7680:X2=-1:X3=0:ZZ=0
16 PRINTX$(142)"█████████████":FORX=1TO5:PRINTXX$(0):PRINTX$(1):NEXT
17 REM *** CONTROL ROUTINNE ***
18 GOSUB31:IFZZ=1THEN37
19 POKES1,200:GOSUB33:FORDE=1TO20:NEXTDE:POKES1,0:GETIN$:IFIN$<>CHR$(136)THEN17

20 REM *** FIRE MISSILE ***
20 FORH1=P1+22TO18185STEP22:IFPEEK(H1)<>32THEN24
21 POKEH1,93:POKEH1,93:POKES1,200+2*(INT(H1-7680)/22)):GOSUB30:IFZZ=1THEN37
22 GOSUB33:POKES1,0:POKEH1,32:NEXTH1:GOTO17

23 REM *** REMOVE BRICKS ***
24 H2=(PEEK(H1)=207)-((PEEK(H1+1)=207)+H2*H3):IFPEEK(H4)=320RH4<7700THEN37:H3=21:GOTO27
25 H1=H1-22:FORH3=1TO21:H4=H1+H2*H3:IFPEEK(H4)<>320RH4<7700THEN37:H3=21:GOTO27
26 POKEH4,32:POKEH4+H2,32:POKES1,250-3*H3:SC=SC+.5
27 H1=H1-22:GOSUB30:IFZZ=1THEN37
28 GOSUB33:POKES1,0:NEXTH3:POKEH1,198.0:GOTO18
29 REM *** MOVE PLAYER ***
30 POKEP1,32:P1=P1+X2*((P1+P2<7680)OR(P1+P2>7700)):IFPEEK(P1+P2)<>32THENZZ=1:RETURN
31 POKEP1,32:P1=P1+P2:POKEP1+30720,0:POKEP1,75:RETURN
```
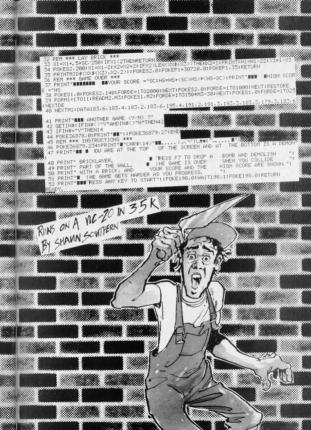
```
32 REM *** LAY BRICK ***
33 X1=X1+.5+SC:250:IFX1<2THENRETURN
34 POKES2,200:X1=X1-21*X2=X2+2:IFX2>LEN(X$(X3))THENX2=1:PRINT:H1=H1-22:X3=1-X3
35 PRINTMID$(X$(X3))X2,2):POKES2,0:POKEP1,35:RETURN
36 REM *** GAME OVER ***
37 PRINT"█████████":YOUR SCORE "=SC:HS=HS+(SC>HS)*(HS-SC):PRINT"██████HIGH SCOR
="HS
38 POKES2,0:POKES2,140:FORE=1TO2000:NEXT:POKES2,0:FORDE=1TO1000:NEXT:RESTORE
39 FORM1=1TO11:READM2,M3:POKES1,M2:FORDE=1TO150:M3-30!NEXT:POKES1,0:FORDE=1TO25
NEXTDE
40 NEXTM1:DATA13,6,183,4,183,2,183,6,195,4,191,2,191,3,183,3,183,3,179,3,183,6

41 PRINT"███ ANOTHER GAME (Y/N) ?"
42 GETIN$:IFIN$="Y"ORIN$="Y"ANDIN$="N"THEN42
43 IFIN$="Y"THEN14
44 POKE36878,0:PRINT"██":POKE36879,27:END
45 REM *** INSTRUCTIONS ***
46 POKE36879,234:PRINT" CHR$(14)"███....└─┘....▏││▲││....██ THE BOTTOM IS A DEMON
47 PRINT"████████ ЮU ARE AT THE TOP  OF THE SCREEN AND AT  THE BOTTOM IS A DEMON
48 PRINT" BRICKLAYER.         █ ▀ESS F7 TO DROP A     BOMB AND DEMOLISH      "
49 PRINT" PART OF THE WALL.     █ ▀HE GAME IS OVER       WHEN YOU COLLIDE     "
50 PRINT" WITH A BRICK. AND     █ ▀OUR SCORE AND THE     HIGH SCORE ARE SHOWN."
51 PRINT" ▀HE GAME GETS HARDER AS YOU PROGRESS.
52 PRINT"███▀ESS ANY KEY TO START"::POKE198,1:WAIT198,1:POKE198,0:RETURN
READY.
```

RUNS ON A VIC-20 IN 3.5K
BY SHAWN SOUTHERN

HUNGARIAN

SQUARES

RUNS ON A TEXAS INSTRUMENTS

T1/99 4A IN 4·8K

BY STEPHEN SHAW

More puzzling than that Cube, more colourful than a trip into hyperspace — that's the Hungarian Squares!

On your screen appear two multicoloured squares. Look carefully and you'll see that each of the two large squares is made up of several smaller coloured squares. The idea of the game is to manipulate the smaller squares to create two big squares of alternating colours. Or you can simply create your own patterns — which might just be easier!

The program is fairly simple, making use of CALL GCHAR and CALL HCHAR, which are the TI equivalent of PEEKING and POKING the screen display, respectively. The screen is 32 columns wide and 24 lines deep. CALL GCHAR and CALL HCHAR use the format:

(ROW, COLUMN, NUMERIC VARIABLE)

where the numeric variable is the ASCI code of the character.

CALL KEY is the equivalent of INKEY\$ or GET — CALL KEY(O,A,B) will return the ASCI value of the key pressed to variable A, B is 0 if no key is pressed.

CALL CHAR defines the characters and CALL COLOR their colours. Numeric arrays are used to hold the screen position of each of the small squares — numbered from 1 to 20 from the top left corner of each large square and counting clockwise.

This program occupies under 4k of memory, but requires 4.8k to operate in. Those arrays take up a little room.

```
100 DIM RA(20),CA(20),RB(20),CB(
20)
120 CALL CHAR(128,"FF80BE8888B88
0FF")
140 CALL CHAR(129,"017D417D057D0
1FF")
160 CALL CLEAR
180 CALL HCHAR(23,26,128)
200 FOR C=96 TO 120 STEP 4
220 CALL HCHAR(24,26,129)
240 CALL CHAR(C,"FF818181818181F
F")
260 NEXT C
280 PRINT "HUNGARIAN SQUARES"
300 CALL COLOR(10;2,16)
320 CALL COLOR(11;2,12)
```

```
340 CALL COLOR(12,2,6)
360 CALL COLOR(13,2,15)
380 CALL COLOR(14,5,14)
400 PRINT "":::" STEPHEN SHAW
1982:::":A MANIPULATIVE PUZZLE"
420 PRINT "":::":PRESS ANY KEY T
O CONTINUE"
440 FOR C=1 TO 6
460 RA(C)=1
480 RB(C)=6
500 CA(C)=C*2+1
520 CB(C)=C*2+1
540 NEXT C
560 CALL KEY(0,A,B)
580 IF B=0 THEN 560
600 CALL CLEAR
620 PRINT "TWO LARGE SQUARES,A &
 B ARE FORMED OF SMALL COLORED
SQUARES"
630 PRINT "THERE ARE TEN SMALL S
QUARES OF TWO COLORS AND NINE OF
 TWO OTHER COLORS"
640 PRINT "THE OBJECT IS TO FORM
ONE OF THE LARGE SQUARES OF I AL
TERNATELY COLORED SQUARES"
650 PRINT "SMALL SQUARES-USING THE COL
ORS OF WHICH THERE ARE TEN SMALL
 SQUARES"
660 PRINT "AND ALSO FORMING THE
OTHER LARGE SQUARE OF ALTERNATE
SMALL SQUARES"
670 PRINT "":":OR YOU CAN TRY TO
FORM YOUR OWN PATTERNS"
700 PRINT "":":PRESS ANY KEY TO
CONTINUE"
720 CALL KEY(0,A,B)
740 IF B=0 THEN 720
760 CALL CLEAR
780 FOR C=1 TO 4
800 RA(6+C)=C*2+1
820 RB(6+C)=C*2+5
840 CA(6+C)=13
860 CB(6+C)=13
880 RA(C+16)=11-C*2
900 RB(C+16)=15-C*2
920 CA(C+16)=9
940 CB(C+16)=9
960 NEXT C
980 CALL HCHAR(4,29,128)
1000 CALL HCHAR(5,29,129)
1020 FOR C=1 TO 6
1040 RA(C+10)=11
1060 RB(C+10)=15
1080 CA(C+10)=21-2*C
1100 CB(C+10)=21-2*C
1120 NEXT C
1140 PRINT "PRESS A OR B..<"
1160 PRINT "PRESS 1 TO MOVE CLOC
KWISE"& 2 TO MOVE ANTICLOCKWIS
E"
1180 FOR C=1 TO 7
1200 CALL HCHAR(RA(C),CA(C),96)
1220 CALL HCHAR(RB(C),CB(C),104)
1240 NEXT C
1260 FOR C=9 TO 16
1280 CALL HCHAR(RA(8),CA(8),112)
1300 CALL HCHAR(RA(C),CA(C),120)
1320 CALL HCHAR(RB(C),CB(C),112)
1340 NEXT C
1360 FOR C=19 TO 20
1380 CALL HCHAR(RA(C),CA(C),96)
1400 CALL HCHAR(RB(C),CB(C),104)
1420 NEXT C
1460 CALL HCHAR(3,5,ASC("A"))
1480 CALL HCHAR(13,17,ASC("B"))
1500 REM ACTUAL MOVEMENT
HERE ***********
1520 CALL HCHAR(21,18,30)
1540 CALL HCHAR(21,18,32)
1560 CALL KEY(0,A,B)
1580 IF B=0 THEN 1520
1600 IF A=ASC("A")THEN 1660
1620 IF A=ASC("B")THEN 2220

1640 GOTO 1500
1660 CALL HCHAR(22,31,30)
1680 CALL HCHAR(22,31,32)
1700 CALL HCHAR(23,31,31)
1720 CALL HCHAR(23,31,32)
1740 CALL KEY(0,A,B)
1760 IF B=0 THEN 1660
1780 REM MOVE SQUARE A
1800 IF A=ASC("1")THEN 1860
1820 IF A=ASC("2")THEN 2040
1840 GOTO 1660
1860 REM MOVE A CLOCKWISE
1880 CALL GCHAR(RA(1),CA(1),TEMP
A)
1900 FOR C=1 TO 19
1920 CALL GCHAR(RA(C+1),CA(C+1),
TEMPB)
1940 CALL HCHAR(RA(C+1),CA(C+1),
TEMPA)
1960 TEMPA=TEMPB
1980 NEXT C
2000 CALL HCHAR(RA(1),CA(1),TEMP
A)
2020 GOTO 1500
2040 REM MOVE A ANTICLOCKWISE
2060 CALL GCHAR(RA(20),CA(20),TE
MPA)
2080 FOR C=19 TO 1 STEP -1
2100 CALL GCHAR(RA(C),CA(C),TEMP
B)
2120 CALL HCHAR(RA(C),CA(C),TEMP
A)
2140 TEMPA=TEMPB
2160 NEXT C
2180 CALL HCHAR(RA(20),CA(20),TE
MPA)
2200 GOTO 1500
2220 CALL HCHAR(22,31,30)
2240 CALL HCHAR(22,31,32)
2260 CALL HCHAR(23,31,31)
2280 CALL HCHAR(23,31,32)
2300 CALL KEY(0,A,B)
2320 IF B=0 THEN 2220
2340 IF A=ASC("1")THEN 2400
2360 IF A=ASC("2")THEN 2580
2380 GOTO 2220
2400 REM MOVE B CLOCKWISE
2420 CALL GCHAR(RB(1),CB(1),TEMP
A)
2440 FOR C=1 TO 19
2460 CALL GCHAR(RB(C+1),CB(C+1),
TEMPB)
2480 CALL HCHAR(RB(C+1),CB(C+1),
TEMPA)
2500 TEMPA=TEMPB
2520 NEXT C
2540 CALL HCHAR(RB(1),CB(1),TEMP
A)
2560 GOTO 1500
2580 REM MOVE B ANTI-
2600 CALL GCHAR(RB(20),CB(20),TE
MPA)
2620 FOR C=19 TO 1 STEP -1
2640 CALL GCHAR(RB(C),CB(C),TEMP
B)
2660 CALL HCHAR(RB(C),CB(C),TEMP
A)
2680 TEMPA=TEMPB
2700 NEXT C
2720 CALL HCHAR(RB(20),CB(20),TE
MPA)
2740 GOTO 1500
2760 END
2780 REM      (C)1982
2800 REM   BY STEPHEN SHAW
2820 REM   10 ALSTONE ROAD
2840 REM   STOCKPORT CHESHIRE
2860 REM   SK4 5AH
2880 REM
2900 REM **********************
2920 END
```

SHARP DEFENDER

RUNS ON A SHARP MZ-80K IN 14K

BY BASIL ZIMMO

Can you defend the inhabitants of an alpine planet from destruction at the hands of alien kidnappers?

In Sharp Defender you are at the controls of a spacecraft flying across mountainous terrain with a mission of protection ahead of you.

The aliens enter from the right, firing and dropping bombs to try and pick off their prey from one of the mountain peaks.

You can judge their approach on the radar screen and try to dodge their fire and pick off the kidnappers off before they can get alien claws into human flesh.

Your task is made more difficult by the antics of the planet's inhabitants, who seem to come from mountaineering stock and climb the peaks regardless of the peril they put themselves in.

If an alien lander reaches his prey or manages to hit your ship, then you lose a life. After three lives the game is over.

Basil Zimmo has produced a very neat graphical representation of the popular arcade game and although it is written in Basic it still proves difficult to excel at.

There are several good presentation touches and the game comes complete with a range of sound effects.

The control keys are: W= up; X= down; A= left; D= right; S= fire; H= hyperspace.

```
1 REM         SHARP DEFENDER
2 REM         Written for C&VG games
4 REM         MAY 1982
5 REM         BY BASIL ZIMMO
6 REM
15 REM * INSTRUCTIONS *
16 REM "█"=CLEAR SCREEN, "█"=CURSOR HOME, "█"=CURSOR DOWN, "█"=CURSOR UP
20 PRINT"█"TAB(13)"D E F E N D E R"
25 PRINTTAB(13):
30 PRINT"█ YOU ARE IN COMMAND OF A DEFENDER SHIP."
35 PRINT"YOUR MISSION IS TO DEFEND THE MEN ON THE":
40 PRINT"MOUNTAINS. IF A MAN IS KILLED OR YOUR  SHIP IS HIT THEN YOU LOSE":
45 PRINT" ONE SHIP. GAMEIS OVER WHEN ALL 3 SHIPS ARE LOST."
50 PRINT"██ CONTROLS ARE:"
55 PRINT" W = UP"
56 PRINT" X = DOWN"
57 PRINT" A = LEFT"
58 PRINT" D = RIGHT"
59 PRINT" S = FIRE"
60 PRINT" H = HYPERSPACE"
80 REM ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890!"#$%&'()∗+←−=£¥.,∕?:[¯]□◇◁●♥♠◯♫+
95 REM CHR$(99)="█"
100 K$=CHR$(99)M$="█"
110 M$=M$+"  "+K$+"∕\      ∕\"+K$+"∕\  "+K$+"∕  "+K$+"∕"+K$+"     "+K$+"∕\  "∕
```

```
120 M$=M$+" ⌐ ⌐     ⌐ "+K$+"/∨/ ⌐ ⌐\"+K$+"/∨    / ⌐ ⌐ \"+K$
130 M$=M$+"⌐       ⌐ ⌐       ⌐ "
140 DIMM$(40):A$="☐PLEASE WAIT WHILE A NEW GAME IS PREPARED"
145 REM * PREPARE MOUNTAINS *
150 FORX=1TO40
155 PRINTMID$(A$,X,1)
160 FORI=0TO160STEP40
170 D$=D$+MID$(M$,I+2,39)+MID$(M$,I+1,1)
180 NEXTI:M$(X)=D$:M$=D$:D$="":NEXTX
181 PRINT"☐        PRESS  ANY  KEY        "
182 GETA:IFA$=""THEN182
185 N$I:S=0
190 SV=4466:SX=4465:SC=53248:Z=0:AL=206:MA=202:SP=64:TEMP07
200 DX=11:DV=INT(RND(1)*9)+9
210 DIMA(4,2),S(4),T(4),E(15,15):PRINT"☐";D$=""
215 REM * RANDOM POSITION FOR ALIENS *
220 FORI=1
230 A(I,1)=INT(RND(1)*15)+62:A(I,2)=INT(RND(1)*11)+2:NEXT
240 H=0:MT=1:GOSUB5000:XD=DX:VD=DV
1000 GOSUB5100:D$="▁▁▁▁":GOSUB2000:GOSUB1920
1010 GOSUB2100:IFH=1THEN4000
1015 GOSUB1500:IFH=1THEN4000
1020 GOSUB5070
1030 GOSUB5100:R=1:GOSUB1500:R=0:IFH=1THEN4000
1040 GOTO1010
1499 REM * MOVE DEFENDER *
1500 POKE17828,0:GETK$:IFK$=""THENRETURN
1510 IF(R=1)*(K$="S")THENRETURN
1520 K=1*(K$="W")+1*(K$="X")+1*(K$="Q")+1*(K$="D")+1*(K$="H")+1*(K$="S")
1530 IFK=0THENRETURN
1540 K=XD=DX:VD=DV:IFK$="H"THEN1860
1550 IFK$="W"THEN1600
1560 IFK$="X"THEN1650
1570 IFK$="A"THEN1700
1580 IFK$="D"THEN1750
1590 IFK$="S"THEN1800
1600 DV=DV-1:IFDV<8THENDV=8:GOTO1910
1610 P=SC+DX+DV*40:FORI=PTOP+3:IF(PEEK(I)=206)+(PEEK(I)=46)THENH=1
1620 NEXTI:GOTO1900
1650 DV=DV+1:IFDV>21THENDV=21:GOTO1930
1660 GOTO1610
1700 DX=DX-1:IFDX<11THENDX=11:GOTO1910
1710 IF(PEEK(SC+DX+DV*40)=46)+(PEEK(SC+DX+DV*40)=206)THENH=1
1720 GOTO1900
1750 DX=DX+1:IFDX>35THENDX=35:DX=1:GOTO1910
1760 IF(PEEK(SC+DX+4+DV*40)=46)+(PEEK(SC+DX+4+DV*40)=206)THENH=1
1770 GOTO1900
1800 MUSIC"_A0"
1810 DX=0:P=SC+DX+DV*40:FORI=PTOP+34-DX:J=1:IFPEEK(I)=ALTHENA=1:I=P+39-DX
1815 IFPEEK(I)=46THENI=P+39-DX:REM DISPLAY CODE 46 = "."
1820 POKEJ,124:NEXTI
```

COMPUTER & VIDEO GAMES 89

```
1830 FORI=PTOJ:POKEI,0:NEXT:IFA=1THEN1850
1840 RETURN
1850 POKEJ,107:MUSIC"_C1B0":S=S+1:POKEJ,0:RETURN:REM DISPLAY CODE 107 = "*"
1860 POKESX,D:POKESY,VD:PRINT"        ":DX=INT(RND(1)*13)+15:XD=INT(RND(1)*9)+12
1870 GOSUB2000
1880 GOTO1910
1900 POKESX,XD:POKESY,VD:PRINT"    "
1901 IFVD>19THEN1916
1905 IFX#="A"+X#="D"THEN1915
1910 POKESX,D:RESETXD+15+I,VD-6+1:RESETDX+15+I,VD-6-1:RESETXD+15+I,VD-6:NEXT
1915 IFVD=8THENPRINT"█":TAB(IC):"▒▒▒▒▒▒▒▒▒"
1916 IFVD>18THENPOKESX,-79:POKESX,13:PRINT"▒▒▒▒▒▒▒▒▒":IFVD>19THEN1930
1920 RESETXD+15,VD-6:RESETXD+18,VD-6
1925 FORI=8TO3:SETDX+15+I,VD-6:NEXT
1930 POKESX,DX:POKESY,DV:PRINTD#
1940 RETURN
1999 REM * DISPLAY DEFENDER *
2000 FORI=-10TO-1:POKESX,DX#:POKESY,DX+(11-I)PRINT"▄":MUSIC"_C3":NEXTI
2010 POKESY,DX+13:PRINT"▀":MUSIC"_C3":NEXTI
2020 IFVD=-5T0G:IFDV=1THENA(I,1)=75
2030 POKESX,DX+1:POKESY,DV+I:PRINT"  ":POKESX,DX+1:POKESY,DV+1:PRINT"█"
2040 IFVD-I>17THEN2070
2050 POKESX,DX+2:POKESY,DV-I+1:PRINT"  ":POKESX,DX+2:POKESY,DV-I
2060 PRINT"▄":"MUSIC"_B2"
2070 RETURN
2080 RETURN
2090 REM * MOVE ALIENS *
2100 FORI=1TO4:RESETRA(I,1),A(I,2)
2110 A(I,1)=A(I,1)-1:IFA(I,1)>26)*(A(I,1)<55)THEN2200
2115 IFA(I,1)<3THENA(I,1)=75
2120 IF A(I,1)=26THENPOKESC+12+(A(I,2)+6)*40,0
2125 IFS(I)>0THENPOKESX(S(I))<46THENS(I)=0
2126 IFS(I)<0THEN2240
2130 SETA(I,1),A(I,2)
2140 NEXTI:RETURN
2200 IFA(I,1)=54THENPOKESC+39+(A(I,2)+6)*40,AL:GOTO2130
2210 IF-SC+A(I,1)-15+(A(I,2)+6)*40:IFPEEK(P+1)=0THEN2400
2215 IFPEEK(P)=0THEN2230
2220 H=1:GOTO2130
2230 IFS(I)<0)*(PEEK(S(I))=0)THENS(I)=0
2231 POKEP+1,0:POKEP,AL:GOSUB2500:IF(S(I)=0)*(RND(1)<.6)THEN2130
2234 IFA(I,1)<27THEN2130
2235 IFS(I)=0THENS(I)=P-1:MUSIC"_#F1"
2240 B=S(I)P-SC+DX+2*DV+40:FORJ=1TO3:POKEB,46:C=B:IF(B)P-2)*(B(P+2)THENH=1
2250 IF-B-P>0THENB=B+39:GOTO2280
2260 IF-B-P<30THENB=B+1:GOTO2280
2270 IF-B-P>0THENB=B-41
2280 IFPEEK(B)=64THENS(I)=0:J=3:B=0
2285 IFPEEK(B)=49THENH=1:S(I)=0:Z=1
2290 IFH=1THENJ=3
2300 POKEC,0:NEXT:POKEB,46:S(I)=B:GOTO2130:REM DISPLAY CODE 46 = ","
2400 A(I,1)=INT(RND(1)*15)+62:A(I,2)=INT(RND(1)*11)+2
2410 GOTO2130
2500 J=SC+A(I,1)+785
```

Illustration: Dorian Crook

```
2510 IFPEEK(J)<>MATHEN2540
2520 IF(P-J)=0THENH=1:Z=1
2530 A(I,2)=A(I,2)+1:GOTO2600
2540 J=SC+A(I,1)+825
2550 IFPEEK(J)<>MATHENH=1:Z=1
2560 IF(P-J)=0THENH=1:Z=1
2570 A(I,2)=A(I,2)+1
2600 POKEP,0
2605 P=SC+A(I,1)-15+(A(I,2)+6)*40:J=SC+DX+DV*40
2610 IF(P>DX-1)*(P<DX+4)THENH=1
2620 IFPEEK(P)=ALTHENA(I,2)=A(I,2)+1:GOTO2605
2625 IFPEEK(P)=MATHENH=1:Z=1
2630 POKEP,AL:RETURN
4000 REM * HIT *
4010 H=0:A$="YOUR SHIP WAS HIT":IFZ=1THENA$="A MAN WAS KILLED"
4020 X=DX*2+2:V=DV*2+2!RESTORE
4025 PRINT"░░░░":TAB(12)!A$:FORI=1TO1000:NEXT
4030 FORI=1TO40
4031 REM * SOUND *
4035 POKE4513,8:POKE4514,50-I:USR(68)
4040 A=INT(RND(1)*15):B=INT(RND(1)*15):IFE(A,B)<>0THEN4040
4045 IF(V-B<0)THENNEXT:GOTO4070
4050 IFA>2THENSETX+A-1,V+B:RESETX-1,V-J:E(I,J)=0
4060 SETX+A,V-B:SETX-A,V+B:E(A,B)=1:NEXT
4070 MUSIC"Z"
4075 FORI=15TO0STEP-1:FORJ=0TO15
4080 IFE(I,J)=1THENSETX+I,V+J:RESETX-I,V-J:E(I,J)=0:GOTO4100
4090 IFE(I,J)=1THENSETX+I,V-J:RESETX-I,V+J:E(I,J)=0
4100 NEXTJ:PRINT"░":H=N-1:IFN=0THEN500
4110 FORI=1TO1000:NEXT:GOTO190
4500 PRINT"░░░░░░░░░░░░"TAB(10)"GAME OVER"
4510 PRINTTAB(10)"ANOTHER GAME?"
4520 GETA$:IFA$=""THEN4520
4530 IFA$="Y"THEN185
4540 IFA$="N"THENPRINT"░":END
4550 GOTO4520
4999 REM * DISPLAY RADAR *
5000 PRINT"┌─────────────────────┐"
5010 FORV=1TO6:POKESV,0:POKESV,0:PRINT"│":POKESV,39!PRINT"│":NEXT
5020 PRINT"└─────────────────────┘"
5030 FORI=SC+320TOSC+720STEP40:POKEI,64:NEXT
5040 POKESV,23:PRINT"▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒"
5050 POKESV,24:POKESX,34:PRINTN:" ":RETURN
5060 PRINT"SCORE:        HIGH:       SHIPS:   ":RETURN
5070 POKESV,24:POKESX,6:PRINTS1:POKESX,20:IFS>HSTHENHS=S
5080 PRINTHS:POKESV,24:POKESX,34:PRINTN:" ":
5090 RETURN
5100 MT=MT+1
5110 IFMT>40THENMT=0
5115 POKESV,24:POKESX,6:T(I)=0
5120 FORI=1TO40:T(I)=0
5121 IF(A(I,2)>12)*(PEEK(SC+A(I,1)-15+(A(I,2)+6)*40)=206)THEN5140
5130 NEXT:GOTO5150
5140 T(I)=-1:NEXT
5150 POKESV,13:POKESX,0:PRINTM#(MT):POKESV,DX:POKESV,DV:PRINTD#
5160 FORI=1TO4:IFT(I)=0THENNEXT:RETURN
5170 POKESC+A(I,1)-15+(A(I,2)+6)*40,206:NEXT:RETURN
```

RUNS ON A BBC MODEL A IN 16K   BY TERRY ALLEN

There's a rainbow hidden inside your BBC micro — can you crack the code and bring a little colour to its circuits?

The computer selects four colours from a choice of six — red, green, yellow, blue, magenta and cyan — and hides them in four locations. You have to guess what four colours the computer has chosen and in what order they are held.

You get eight attempts to solve the puzzle. Each time you make an attempt the computer will tell you how many of the colours you have got right and how many you have placed in the correct position. As you may have already guessed this game is similar to that famous board game Mastermind.

The computer's choice will be revealed at the end of each game. Instructions on which keys to use are included in the program.

Will you be able to find you way over the rainbow?

```
  1 REM ************************
  2 REM * Listing courtesy of *
  3 REM * Microage Electronics *
  4 REM ************************
 10CLS:Y=0:GOTO90
 20DEFPROCCOLOUR
 30FORW=0TO5:FORZ=0TO3
 40PRINTTAB(0,Z*6+W);CHR$(134-Z-Y);CHR$157
 50NEXT Z
 60FORV=1TO200:NEXT V:NEXTW
 70Y=Y+1:IF Y=3 THENY=0
 80ENDPROC
 90PROCCOLOUR
100PRINTTAB(13,8);CHR$151;CHR$141;"F O U R";TAB(13,9);CHR$151;CHR$141;"F O U R
"
110PRINTTAB(10,14);CHR$151;CHR$141;"C O L O U R S";TAB(10,15);CHR$151;CHR$141;
"C O L O U R S"
120FORU=1TO3000:NEXT
130PROCCOLOUR
140PRINTTAB(13,8);SPC(7);TAB(13,9);SPC(7);TAB(10,14);SPC(13);TAB(10,15);SPC(13
)
150PRINTTAB(7,9);CHR$135;"Do you want instructions?"
160PRINTTAB(4,14);CHR$132;"Type 'Y' for YES or 'N' for NO"
170Q$=GET$
```

FOUR COLOURS

YELLOW BLACK
GREEN PINK
BLUE ORANGE
WHITE RED
BROWN INDIGO

```
180IF Q$="Y" THEN210
190IF Q$="N" THEN720
200GOTO170
210CLS
220PRINTTAB(2,3);"The computer selects four colours"TAB(2,5);"from these six:
"
230PRINTTAB(12,7);CHR$129;"Red";TAB(22,7);CHR$145;CHR$255
240PRINTTAB(12,9);CHR$130;"Green";TAB(22,9);CHR$146;CHR$255
250PRINTTAB(12,11);CHR$131;"Yellow";TAB(22,11);CHR$147;CHR$255
260PRINTTAB(12,13);CHR$132;"Blue";TAB(22,13);CHR$148;CHR$255
270PRINTTAB(12,15);CHR$133;"Magenta";TAB(22,15);CHR$149;CHR$255
280PRINTTAB(12,17);CHR$134;"Cyan";TAB(22,17);CHR$150;CHR$255
290PRINTTAB(2,19);"It holds them hidden in four positions"
300PRINTTAB(6,24);"Press any key for next page";
310R$=GET$
320PROCCOLOUR
330PRINTTAB(2,3);SPC(33)
340PRINTTAB(2,5);CHR$135;"You have to guess which colours and"
350PRINTTAB(2,7);CHR$132;"in which order they are held."
360PRINTTAB(2,9);CHR$132;"You can make up to eight attempts."
370PRINTTAB(2,11);CHR$131;"Each attempt is marked to show how"
380PRINTTAB(2,13);CHR$135;"many are of the correct colour and"
390PRINTTAB(2,15);CHR$135;"how many are also in the correct"
400PRINTTAB(2,17);CHR$135;"position."SPC(12)
410PRINTTAB(2,19);SPC(38)
420S$=GET$
430CLS
440PRINTTAB(2,1);"To choose your colours press the"
450PRINTTAB(2,3);"number keys 1 to 6. They will print"
460PRINTTAB(2,5);"coloured blocks as shown below:"
470PRINTTAB(5,7);CHR$129;"Key 1  Red";TAB(21,7);CHR$145;CHR$255
480PRINTTAB(5,9);CHR$130;"Key 2  Green";TAB(21,9);CHR$146;CHR$255
490PRINTTAB(5,11);CHR$131;"Key 3  Yellow";TAB(21,11);CHR$147;CHR$255
500PRINTTAB(5,13);CHR$132;"Key 4  Blue";TAB(21,13);CHR$148;CHR$255
510PRINTTAB(5,15);CHR$133;"Key 5  Magenta";TAB(21,15);CHR$149;CHR$255
520PRINTTAB(5,17);CHR$134;"Key 6  Cyan";TAB(21,17);CHR$150;CHR$255
530PRINTTAB(2,19);"The above code may be repeated at"
540PRINTTAB(2,21);"the foot of the playing page."
550PRINTTAB(6,24);"Press any key for the next page";
560T$=GET$
```

```
570PROCCOLOUR
580PRINTTAB(2,3):SPC(32)
590PRINTTAB(2,3):CHR$132"The computer's choice will be         ";
600PRINTTAB(2,5):CHR$132"revealed at the end of each game."
610PRINTTAB(2,7):CHR$135"Don't forget you have only eight"
620PRINTTAB(2,9):CHR$135"attempts.":SPC(12)
630PRINTTAB(2,11):CHR$135"If you would like to read the"
640PRINTTAB(2,13):CHR$135"instructions again press 'Y'."
650PRINTTAB(2,15):CHR$135"Otherwise press 'N' and the game"
660PRINTTAB(2,17):CHR$135"will start.":SPC(10)
660PRINTTAB(2,19):SPC(34):TAB(2,21):SPC(33):TAB(2,23):SPC(20):TAB(6,24):SPC(31
);
680U$=GET$
690IF U$="Y" THEN Y=2:GOTO210
700IF U$="N" THEN720
710GOTO680
720CLS:PRINT
730PRINT"   Attempt     Colours      No. correct in-"
740PRINTTAB(4):"No.":TAB(13):"Chosen":TAB(24):"colour   position";
750PRINTTAB(7,19)"Press the number keys for"
760PRINTTAB(6,19)"the colours you choose as"
770PRINT"shown below:-"
780PRINTTAB(6):CHR$129"1 RED":CHR$130"  2 GREEN":CHR$131"  3 YELLOW"
790PRINTTAB(6):CHR$132"4 BLUE":CHR$133"  5 MAGENTA":CHR$134"  6 CYAN"
800A=RND(6):B=RND(6):C=RND(6):D=RND(6)
810FORF=1TO8
820G=0:H=0:I=A:J=B:K=C:L=D
830FOR M=1TO4
840IF M=1 THENPRINTTAB(4,1+F*2):F
850N$=GET$:N=VAL(N$)
860IF N=0 OR N>6 THEN1250
870PRINTTAB(10+2*M,1+F*2):CHR$(128+N):CHR$255:
880IF A AND M=1 THEN H=H+1:GOTO920
890IF N=B AND M=2 THEN H=H+1:GOTO920
900IF C AND M=3 THEN H=H+1
910IF M AND M=4 THEN H=H+1
920IF N=I THEN G=G+1:I=0:GOTO960
930IF J THEN G=G+1:J=0:GOTO960
940IF K THEN G=G+1:K=0:GOTO960
950IF N=L THEN G=G+1:L=0
960NEXT M
970PRINTTAB(26,1+F*2):CHR$135:G:TAB(35,1+F*2):H
980IF H=4 THEN1010
990IF F=8 THEN1110
1000NEXT F
1010FOR O=0TO4
1020PRINTTAB(7,19+O):SPC(25):NEXT
1030ON F GOTO 1040,1050,1060,1060,1070,1070,1080,1080
1040PRINTTAB(13,19)"Dead lucky!!":GOTO1150
1050PRINTTAB(6,19)"Lucky! ":GOTO1090
1060PRINTTAB(3,19)"Excellent. ":GOTO1090
1070PRINTTAB(3,19)"Very good. ":GOTO1090
1080PRINTTAB(7,19)"Good. "
1090PRINT"Success at attempt No. ":F
1100GOTO1150
1110FOR O=0TO4
1120PRINTTAB(7,19+O):SPC(25):NEXT
1130PRINTTAB(0,19)"Hard luck, no success after 8 attempts."
1140GOTO1150
1150PRINTTAB(12,20) CHR$(128+A):CHR$255:CHR$(128+B):CHR$255:CHR$(128+C):CHR$255:
CHR$(128+D):CHR$255
1160PRINTTAB(2)"The computer's choice is shown above."
1170FOR I=1TO3000:NEXT
1180PRINT"Do you want to play again? Type Y or N"
1190P$=GET$
1200IF P$="Y" THEN720
1210IF P$="N" THEN1230
1220GOTO1190
1230PRINT:PRINTTAB(10)"Thankyou.    Goodbye        ";
1240END
1250PRINTTAB(9,VPOS+1):CHR$134"Wrong key try again"
1260FOR T=1TO5000:NEXT
1270PRINTTAB(10,VPOS-1):SPC(21)
1280GOTO850
```

FLAWED MASTER-WORK

You have written your masterpiece, and the first Adventurer to receive his cassette from your software house starts to play. Eventually he is confronted by a problem which you consider to be one of your more brilliant touches! Until he types in the necessary sequence of commands, he can go no further.

What you assumed was an obvious solution given some thought, is too obscure for your player and he is now hopelessly stuck. What is worse, he is becoming bored and about to tell all his fellow Adventurers so. How can you, the author, avoid this?

Ask some friends round to have a go at your Adventure while you are still writing it. Not everyone has a mind bent towards the kind of thinking needed to play Adventure, so you must select you guinea pigs carefully!

Invite them one at a time so you will want to see how they react individually. Sit with them and make a note of each problem with which they have unreasonable difficulty. Now you can decide where extra clues are needed.

The most direct way to introduce these is for each clue to be a response to the word HELP. Let us look at an imaginary example.

Consider the garden in which last month we grew a beanstalk. The garden was location no.4, a spade, bean and bucket were objects 5, 9, and 12 respectively. If the bucket is empty the flag C(12) will be 2. Figure 1 shows a series of possible steps in the player's logic, and a suggested response from the computer to the command HELP.

If control passes to — say — line 4000 when HELP has been decoded by the reply decoding routine, then:
4000 ON LN GOTO 4100,4200,4300, 4400,4500

will access a different HELP routine for each location. (Each problem will be location dependent.)

Here the location is 4, so control will pass to line 4400.

4400 IF C(5) = 2 THEN LET Q1$ = "NEEDS DIGGING": GOTO 100

Arranging for C(5) to be increased to 3 when a hole is dug, we can continue:
4410 IF C(5)=3 THEN LET Q1$="HOLE IS BEAN-SIZED":GO-TO 100
4411 REM GOODNESS! HASN'T HE FOUND THE BEAN YET?

As C(5) is again increased by 1 when the bean is planted, we can use this bet not only in the PLANT routine, but also for HELP:
4420 IF C(5)=4 THEN LET Q1$="GROUND IS VERY DRY"
4421 REM YES — IT WILL NEED WATERING! WHEN DONE C(5)=5
4430 IF C(5)=5 THEN LET Q1$="SOMETHING AT THE TOP": GOTO 100
4431 REM CLIMB IT FOR HEAVEN'S SAKE!
4440 LET Q1$ = "SORRY I CANT": GOTO 100

C(5) will be increased to 6, and therefore this line will execute by default when the beanstalk is chopped down later.

Finally, all the IF statements can be avoided by the use of ON . . GOTO:
4400 ON C(5)−1 GOTO 4105,4410, 4420,4430,4440
4405 LET Q1$ = "NEEDS DIGGING": GOTO 100 . . . etc.

FIGURE 1

PLAYER'S ACTION	PLAYER THINKS	REPLY TO HELP
Arrives in garden	Oh! A garden! What do I do?	Needs digging
Finds spade, goes into garden, digs	Hello! a hole! What use is it?	Hole is bean-sized
3 months later, finds bean & plants it in hole	How disappointing Only a beanshoot	Ground is very dry
3 months later, finds water & bucket, waters beanshoot	What on earth can I do with a huge beanstalk?	Something at the top

The date is April 2nd 1913. A telephone in your Scotland Yard office rings. "Inspector Strade here. There's been a murder at Crowley Manor." So the mystery starts.

By two word commands you find yourself on the street, there's no alternative. You seem powerless but to follow the plot. A hansom cab picks up. The driver smiles at you. Nothing to worry about, he is just trying to lure you to take his cab to Crowley Manor.

Now I'm the awkward type and did everything I could to avoid using that cab. But eventually I had to let events overtake me.

I was convinced that the game was going to solve itself, but it was not to be.

After stumbling over a body and slipping on something slimy. I found the game became quite difficult — mainly due to the inconsistency of the form of the commands recognised.

The worst offender was a hole I wished to traverse. After I gave up, Neil, my 14 year old son tried out his American on it — CLIMB THRU HOLE — and succeeded! I was so frustrated I left him to solve the mystery!

The Curse of Crowley Manor runs on a TRS-80 and Video Genie in 16k, and is obtainable from Calisto Computers.

Savage Island Part Two starts where Part One left off, and for me doesn't go much further — yet! A neon sign proclaims: "Part 1 will seem like a piece of cake compared with what you are about to go through!"

That sign is difficult enough to get to! Can anyone help?

Not having played Golden Voyage, Scott Adam's latest, I was unable to offer any advice to a desperate reader who had contacted me recently. Intrigued, I had a go, and would now put money on where he is stuck. Please "STEP UP" Mr Reader and tell me if I'm right!!

By KEITH CAMPBELL

The ZX Printer – available now

Designed exclusively for use with the Sinclair ZX range of computers, the printer offers the full ASCII character set – including lower-case characters and high-resolution graphics.

A special feature is COPY which prints out exactly what is on the whole TV screen without the need for further instructions. Printing speed is 50 characters per second, with 32 characters per line and 9 lines per vertical inch.

The ZX Printer connects to the rear of your ZX Spectrum. A roll of paper (65ft long and 4in wide) is supplied, along with full instructions. Further supplies of paper are available in packs of five rolls.

The ZX Microdrive – coming soon

The new Microdrives, designed especially for the ZX Spectrum, are set to change the face of personal computing.

Each Microdrive is capable of holding up to 100K bytes using a single interchangeable microfloppy.

The transfer rate is 16K bytes per second, with average access time of 3.5 seconds. And you'll be able to connect up to 8 ZX Microdrives to your ZX Spectrum.

All the BASIC commands required for the Microdrives are included on the Spectrum.

A remarkable breakthrough at a remarkable price. The Microdrives are available later this year, for around £50.

How to order your ZX Spectrum

BY PHONE – Access, Barclaycard or Trustcard holders can call 01-200 0200 for personal attention 24 hours a day, every day. BY FREEPOST – use the no-stamp needed coupon below. You can pay by cheque, postal order, Barclaycard,

Access or Trustcard.

EITHER WAY – please allow up to 28 days for delivery. And there's a 14-day money-back option, of course. We want you to be satisfied beyond doubt – and we have no doubt that you will be.

RS232/network interface board

This interface, available later this year, will enable you to connect your ZX Spectrum to a whole host of printers, terminals and other computers.

The potential is enormous. And the astonishingly low price of only £20 is possible only because the operating systems are already designed into the ROM.

To: Sinclair Research, FREEPOST, Camberley, Surrey, GUI5 3BR.			Order	
Qty	Item	Code	Item Price	Total
	Sinclair ZX Spectrum – 16K RAM version	100	125.00	
	Sinclair ZX Spectrum – 48K RAM version	101	175.00	
	Sinclair ZX Printer	27	59.95	
	Printer paper (pack of 5 rolls)	16	11.95	
	Postage and packing: orders under £100	28	2.95	
	orders over £100	29	4.95	
			Total £	

Please tick if you require a VAT receipt ☐

*I enclose a cheque/postal order payable to Sinclair Research Ltd for £
*Please charge to my Access/Barclaycard/Trustcard account no.
*Please delete/complete
as applicable

Signature
PLEASE PRINT
Name: Mr/Mrs/Miss
Address

CVG 810

FREEPOST – no stamp needed.   Prices apply to UK only.   Export prices on application.

MATHS IS ALL YOU NEED . . .

One aspect of computer graphics that seems to concern many of the people interested in it is the idea that it is necessary to know a good deal of mathematics.

To see how much mathematics it is necessary to know in order to generate useful graphic displays on a microcomputer it is useful to examine the way in which the user is producing them.

In terms of the mathematics to be used, the two extreme positions are those of the programmer who writes all his own graphics software to generate the displays he wants on his system, and that of the person who simply uses an existing program as a tool for making the displays he wants for his own purposes.

If we examine these extremes, the writer of a graphics program must know all the mathematics necessary to achieve his effects because the mathematics must be built into the program itself.

The basic area of mathematics that is called on is, of course, geometry. Two-dimensional geometry is studied at school by most people, and is found as simple as anything in mathematics by most people simply because it can be treated in a pictorial way.

Three-dimensional geometry is usually found to be a good deal more difficult mainly because the visualisation of solid objects and shapes is not easy for most people.

Other mathematical techniques include the calculus and matrices. Since the use of the matrix is included in all modern maths syllabuses, this is an area that is familiar to many. More sophisticated forms of geometry that are of great value are differential geometry and homogenous coordinate geometry.

The graphics programmer writes programs for the user at the other of our extremes who simply uses existing programs.

Such a user needs to learn how to run a particular program: he needs only a qualitive and mathematical appreciation.

Learning to use a graphics program may not require an entirely negligible effort, but it is clearly a far simpler task than mastering the mathematics that went into the writing of the program itself.

Programs that can be used in this way have been written for applications that include generating and storing screen displays for later incorporation in other programs, such as games, and computer-aided design programs in which a graphic display enables the user to examine the results of his design efforts.

Programs for displaying three-dimensional shapes can have many uses, notably in education, but also for example, for use by architects to display models of buildings in the planning stage to their clients.
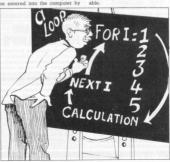
Another way to produce graphics which requires the use of no mathematicals at all is to use a graphics tablet such as is available for the Apple and Atari machines.

With such a device, shapes can be entered into the computer by tracing them on the digitising surface of the tablet or by building them up with lines in the ways provided by the menu of commands possessed by the tablet and its software.

The number of graphics input devices for microcomputers is increasing: at the recent Pet show a digitiser that is usually used with mainframe computers was shown interfaced to a Pet. Also, more graph plotters are available for micros, so that graphic results can be saved in permanent form.

In between the two extremes it is necessary to be familiar with a certain amount of mathematics to amend graphics programs that do not do exactly what you want. To make the change it is necessary at least to understand the mathematics incorporated in the relevant routine.

So the answer to the application "How much mathematics do I need for graphics?" is that you need quite a lot to write your own graphics programs, that a little, at least, is needed if you need to modify graphics programs, but that none at all is needed if you are content just to use some of the many fine graphics programs that are available.

PRACTICAL PROGRAMMING

FAST THINKING THE QUICK WAY

When entering programming competitions like Beat the Bugs it is useful to make an early impression on the judges by giving your program a fast solution time.

This month I am looking at methods for making programs run faster. This is because I have recently bought a Spectrum and, although I am generally happy with it, it is much slower than the Compukit I am used to.

Although computers can perform simple calculations with no noticeable delay, the calculations do take a finite time and when there are thousands or millions of calculations to be done it may be necessary to reduce the delays.

The main reason for needing to speed up a program are moving graphics that must move smoothly instead of jerkily and to cut down the waiting time in "number crunching" programs that take hours or days performing millions of calculations to solve a mathematical problem.

There are several simple methods of speeding programs by taking advantage of the way the Basic interpreter works. Consider programs (1) and (2) below:

```
(1) 200 FOR I = 1 TO 1000
    210 GOSUB 500
    220 NEXT I
    230 STOP
    500 RETURN
```

```
(2) 200 FOR I = 1 TO 1000
    210 GOSUB 500
    220 NEXT I
    230 STOP
    300 REM
    310 REM
    .  .  .
    390 REM
    500 RETURN
```

Timing these on the Spectrum gave 7.5 seconds for (1) and 8.5 seconds for (2).

The reason the second program takes longer is that when line 210 is executed the Basic interpreter searches for line 500 by looking through the whole program, starting at the beginning and checking each line number until it finds the line it is looking for. We can see from this that a program will run faster when the most frequently used subroutines are placed near the beginning of the program.

If the saving in speed due to having subroutines near the beginning of the program is really significant the program could be laid out as follows:

```
    10 GOTO 500
   100 REM Most frequently used
       sub-routine

   190 RETURN
   200 REM Next subroutine
       .  .  .

   500 REM Main Program
       .  .  .
```

The interpreter will handle GOTO in the same way as GOSUB, searching through the line numbers until it finds the one it is looking for, and it is possible to speed up a program by arranging for the beginning of GOTO statements to come near the beginning of the program.

REM LINES AND FOR, NEXT LOOPS

Although it is good practice to include plenty of REMarks in a program to explain what it is doing, the program will run faster without the REM lines and if the extra speed is essential these lines can be deleted from the final version.

It is also faster to use FOR...NEXT loops than IF...THEN...GOTO loops. Comparing programs three and four:

```
3) 10 FOR I = 1 TO 1000
   20 NEXT I
```

```
4) 10 LET I = 1
   20 LET I = I + 1
   30 IF I <= 1000 THEN
      GOTO 20
```

program three takes 4.4 seconds, while program four takes 8.2 seconds.

A simple counting loop as in program four would normally be written as a FOR...NEXT loop in the first place. However, where a loop would normally be written with IF...THEN...GOTO..., there are tricks we can use to replace the loop by FOR...NEXT. For example, suppose we have

```
110 (start of loop)
190 IF A >= B THEN GOTO 110
```

we could eliminate the slow GOTO by writing

```
100 FOR I = 1 TO 1 STEP 0
110 (start of loop)

190 IF A = B THEN LET I = 2
200 NEXT I
```

Because we have STEP 0 in line 100 the FOR...NEXT loop would not normally finish but when A = B in line 190 the value of I will be changed to a value greater than the upper limit of the loop and the loop will then finish.

Another method of speeding up programs can be seen from the following example:

```
5) 10 LET A = 0
   20 LET B = 0

   80 LET H = 0
   100 FOR I = 1 TO 1000
   110 LET A = A
   120 NEXT I
```

```
6) replace line 110 in (5) by 110
   LET A = H
```

BY TED BALL

Program five takes 7.9 seconds, program six takes 8.5 seconds.

The reason for this difference is in the way the variables are stored inside the computer. The Basic interpreter maintains a table of the variable names and the current values of the variables, and whenever it comes across a new variable name it is added at the end of the table. When the interpreter needs to use a variable it starts looking at the beginning of the table and works through until it finds the name it is looking for. Thus, in program (5) the "A" on the right hand side of the assignment was found on the first check, but in (6) the interpreter had to go through "A", "B", "C",... until it came to "H".

FACT AND FICTION ABOUT VARIABLES

You may read in some places that using variables instead of numeric constants will make a program faster. This is true in Microsoft Basic, used on the Pet, Apple, Compukit, and many other computers, but it is not true in Sinclair Basic, used on the ZX81 and Spectrum. Consider program (7), obtained by replacing line 110 in (5) by

110 LET A = O

On the Spectrum, program seven takes 7.7 seconds, and is thus faster than five and six; however on the Compukit the times for programs five, six and seven are 2.7 seconds, 3.0 seconds and 3.0 seconds respectively (you can see from these comparative timings that I am not happy with the speed of the Spectrum).

The reason that variables are faster than constants in Microsoft Basic but not in Sinclair Basic is the way the program is stored in the computer. In Microsoft Basic a constant is stored as the character codes for the individual digits and the string of character codes is converted to a binary number every time the constant is used; the conversion takes longer than looking up the value of a variable, which is stored as a binary number.

In Sinclair Basic, however,

The Beat the Bug puzzle which called for fast programs and fast thinking!

although the string of character codes for the digits of a number are stored in the program the corresponding binary number is also stored inside the program, and can be obtained faster than a value from the variable table.

The methods considered above do not actually reduce the amount of calculation done by a program; these methods give an increase in speed by cutting down the amount of "housekeeping" the interpreter needs to do. Although these methods can give good improvement in speed, really significant improvements can usually be obtained only by actually reducing the amount of calculation to be performed.

To take a practical example, consider a puzzle I saw recently in a magazine. Abstracted from the trimmings about childrens' ages the puzzle boils down to finding the smallest non-trivial integer solutions to the equation

$$a^3 + b^3 = c^3 + d^3$$

The obvious method to try first is just to compare the values of the two sides of the equation for all possible values of a, b, c, d, until we find values that satisfy the equation. As the puzzle was about childrens' ages we can assume that 16, say, is an upper limit for a, b, c, d, and

write a simple program to test all values up to 16.

```
10 FOR A = 1 TO 16
20 FOR B = 1 TO 16
30 FOR C = 1 TO 16
40 FOR D = 1 TO 16
50 IF  (A=C)  OR  (A=D)  THEN
   GOTO 70
60 IF A*A*A + B*B*B = C*C*C +
   D*D*D THEN GOTO 110
70 NEXT D
80 NEXT C
90 NEXT B
100 NEXT A
110 PRINT A; " ";B; " ";C; " ";D
```

On the Spectrum this takes 1 minute 28.8 seconds, and since it is only the answers that are needed and the program would only be used once, we would normally not bother to try making the program faster.

However, we can note that A*A*A, B*B*B, C*C*C is recalculated in line 60, inside the inner loop, although their values do not change every time D changes. If we alter the program by adding:

```
15 LET M = A*A*A
25 LET N = B*B*B
35 LET P = C*C*C
```

and changing line 60 to

```
60 IF M + N = P + D*D*D THEN
   GOTO 110
```

the time for the program is reduced to 1 minute 10.8 seconds.

When panels of bridge experts are usually divided on the best way to play any given situation, what hope is there for the poor bridge programmer of teaching his computer the best responses?

Most bridge magazines run a bidding competition with a panel of experts tackling—perhaps 10 bidding situations. The trouble lies in the fact that there is only a majority vote on which to base marks, for the competition — it is not at all unusual for a panel of 24 international experts to share their votes over five or six possible bids!

Another type of problem approximates to the "over-the-border" (horizon effect) that you find in chess circles — in bridge you are given declarer's hand and dummy, the opening lead and any opposition bidding and are invited to find the best line of play. Sometimes but rarely

SEARCH FOR A SOLUTION

Finding ways a computer can overcome bridge problems presents many unique difficulties.

The "exhaustive search" technique which helped chess computers "Play and mate in two moves" over 15 years ago, has limited possibilities when it comes to bridge.

Consider a full bridge hand — in how many ways can it be played? Much depends on the distribution of the particular hand but if you argue that the nth trick can be started in (14-n) ways and that the other two players (on average) will be able to follow suit with about quarter of their remaining cards then at least we will have an estimate. It looks like $13 \times 3 \times 3 \times 3$ for the first trick, $12 \times 3 \times 3 \times 3$ for the second, $6 \times 2 \times 2 \times 2$ for the eight, $1 \times 1 \times 1 \times 1$ for the last.

That is roughly $13! \times 3^{9} \times 3^{9} \times 3^{9}$. And that is — but I'll leave you to work it out . . . With present computing power it is obviously hopeless to use this method on full hands.

Suppose that we consider a simple three-card problem "South is on

BY ALAN HIRON

you are told that it is a 100% play (a "sure tricks" hand); sometimes you are just required to find the best percentage play.

These are the problems that the existing bridge computers are geared to attempt. Not very efficiently, as we have seen, but they do try and cope.

Finally we have what is called a double-dummy problem. Strictly speaking the name is something of a misnomer for you are shown all four hands, told the lead and the contract and invited to find the winning play that succeeds against any defence. Frequently some cards have already been played and you may be required, say, with seven cards in each hand remaining, to make six out of the last seven tricks.

So how does a computer cope?

lead, there are no trumps and he has to make two of the last three tricks."

```
        S 8 7 6
S K J 10      S 5 4 3
        S A Q J 9
```

You got there I see? South must lead S9. West has to win and now South makes the last two tricks. Childish by human standards for no other play succeeds unless West does something silly. What about an exhaustive search? It is not too difficult here as all of the cards are spades, the possible plays to trick 1 are $3 \times 3 \times 3 \times 3$ (=81) in number; there are $2 \times 2 \times 2 \times 2$ (=16) play to trick 2 and no problem about the third trick. So 1296 possibilities exist.

The human analyst will notice at once that he doesn't have to worry about all these — as far as winning tricks is concerned East's cards are all identical in value and so are North's as far as his hand is concerned.

An ingenious programmer might profitably take advantage of this but now you have the old problem — a lot of program to test for this sort of possibility, or is a shorter program that races through all the combina-

tions quicker in the long run?

If you think about the logic of solving the simple problem above, then you must think on these lines:
1) There are 6×6 ways for North-South to play their cards.
2) Associated with each of these 36 ways there are 36 ways for East-West to play their cards. Calculate the number of tricks made in every case. If, for any of the North-South possibilities, at least two tricks are made whatever East-West try, then the solution has been found.
3) There may be more than one solution, so the search continues.

In this way all possibilities are explored and a definite answer (or answers!) obtained. Even this can be an irritating affair to program and there are the obvious complications of more cards in each hand, all four suits being involved, and the possibility of a trump suit.

In the next article I will consider how the "exhaustive search" can be reduced to a "tree search". The idea is that once a "branch" has been found to be unsuitable, it isn't explored any further. There will be the certainty of far more subtle programming being required but the length of the calculation may be reduced by several orders of magnitude. Then we will be in business for solving six or seven card (per hand) problems but still not tackling a full deal.

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FAST FURIOUS AND LOTS OF FUN!

STARBLAZER

You are at the controls of a supersonic Starblazer jet fighter on a mission to destroy enemy radar bases which are ruining your air force's chance of a successful mission.

The bases are particularly hard to hit as you can only drop your bombs when you are close to the ground, running the risk of crashing into the pylons which flank the radar dishes.

Points can also be scored by bombing the buildings in and around the radar installation —

though this of itself will not qualify you to go on to mission two, and attempt to bomb the supersonic tank.

Picking off these buildings is, however, good bombing practice — and I was soon able to work out just the right height and position on the screen to hit the radar bases at least three out of five times.

Once you have hit a radar base your Starblazer zooms up to

the top right hand corner of the screen and mission two flashes up the message "destroy supersonic tank". This, alas, is easier said than done.

First you must dodge or shoot a barrage of missiles which fly at you at great speed moving left to right across the screen. If you survive this onslaught you can then attempt to dive-bomb the supersonic tank which — maddeningly — seems to be always just out of your bombing range.

Missions 3, 4 and 5 were unfortunately beyond the ken of this particular Starblazer — but for the benefit of any ace pilots who may be reading this you have to bomb the ICBM — a mushroom

like structure — attack a more advanced tank which fires back. If you survive all that you get a chance to wipe out the H.Q.

I have a particular affection for this type of game and Starblazer was no exception. It offers fast action and sufficient difficulty to make you keep coming back to improve your performance. I played the game using the keyboard though it can be played with a joystick — which I would imagine would greatly improve playability.

Starblazer runs on Apple II in 48K. It is available from the London based Software House at £19.

- ● Getting started — 9
- ● Value — 7
- ● Playability — 9

A HAUNTING CHALLENGE

SNAPPER

Ghosts may come and go but Acornsoft's Snapper will haunt you for some time.

This is Pacman as enjoyed in the arcades, with just a few changes which will probably go unnoticed by many who buy this cassette. The maze has undergone a few changes (programmer's licence) but the tunnel is still there. So is the long and dangerous stretch at the bottom of the screen.

The ghosts are as perfect as possible, eyes swivelling in the direction they are heading.

On being eaten their eyes return to the house in the centre of the screen and the blue edible specimens are as arcade players will remember them.

Perhaps the most noticeable change is with the energy dots which when transversed during ghost-chasing, are not consumed.

Keyboard control soon becomes as familiar and then the family tussle to put their names on top of the high-score chart.

It's all there, music, lights and action for £9.95 inclusive of VAT for the BBC Model B.

- ● Getting started — 7
- ● Value — 8
- ● Playability — 8

The complete guide to discovering if you'll enjoy the cassette or disk reviewed:

Getting Started refers to loading instructions, loading difficulties and whether or not the game is easy to understand.

Value is the value-for-money side. Does the cassette or disk appear well presented and put together? Does it make good use of the machine's abilities?

Playability is probably the most important mark to look at. Is the game a good example of its type? If it is an original idea, will it succeed in holding your attention.

The main bulk of the review is the place where our games testers can give their own opinions on the offering but the marks seek to provide an accurate buying guide.

SLOW INVADERS WILL FAIL TO CONQUER EARTH . . .

VIC INVADERS

You won't need to be a king of the arcades to repel this squadron of Vic Invaders.

The game is written in machine code and apparently has five skill levels — though I could discern no great difference between skill level one and five.

The game gives you no mystery flying saucers to shoot at — thus ignoring the most enjoyable aspect of the arcade version of Space Invaders.

It is also very easy to stay alive. All you have to do is keep the space bar depressed and a constant stream of missiles will cancel out the missiles of the advancing fleet. I almost managed to wipe out an entire fleet by keeping the space bar depressed without moving right or left.

Another disappointing feature of this game is that you cannot fire and move your gun turret at the same time. This makes it

impossible to zoom in and hit that last invader on the run with style.

The game could also have been greatly improved if the high score display kept a running total of high scores, rather than giving every last score as the current high score, whether it was higher or not.

The producers must have realised it was rather easy and gave just one life, instead of the usual three.

The missiles in this game also left a little to be desired — jerky skywards and pausing mid-screen for breath.

Vic Invaders is available from Stockport based Bridge Software. It costs £6.90 and runs on the unexpanded VIC-20.

- ● Getting started — 8
- ● Value — 2
- ● Playability — 2

A NICE LITTLE MOVER

There was something very sinister about the way this chess program went about assuring itself of a good review.

My first encounter with it came on level two where it boasted a 35 second response time to the average move. (Careful timing put it a little above this but perhaps my moves were just above average).

It started brightly despite not having a book opening repertoire to fall back on. Snapping up my queen's bishop's pawn gambit, it held onto the extra piece tenaciously enough during the opening and also developed its pieces well. Doing, just enough, in fact, to make me think I had found a worthy opponent and then, when it sensed I was ripe for the taking, it capitulated to a particularly sweet queen and bishop attack and allowed itself to become mated soon afterwards so that I didn't get bored by the endgame.

black, it understands castling and en passant.

I miss not being able to play through my favourite openings with impunity but what can you expect for £6.95?

Further testing on its other levels still suggested that the 35 second response game is the best to play unless you have something to do whilst awaiting in next move in the higher levels.

At lowest response level (five seconds) I felt I was getting my own way rather too easily.

The screen disappears while the computer is thinking, so you will need your own board to study if you are going to take the game seriously. The computer display does take a little getting used to, as does algebraic notation but the extensive instruction has a help here.

The computer will not allow illegal moves, it will let you play

The result: one reviewer feeling particularly pleased with himself and more than willing to write nice things about the opponent which had just given in so graciously.

Sinclair ZX81 Chess is produced for the 16K machine by Psion.

● **Getting started** 9
● **Value** 8
● **Playability** 6

DEADLY DEATH SHIPS

Omega Race is that rare thing in computer software — a truly compulsive game.

The year is 2003. Aliens are attacking the city of Komar. You must defend the city in your arrow shaped space craft.

The game is played using VIC paddles which can be purchased from most VIC dealers at around the £14 mark.

The ship is quite difficult to control and at first appears to float around the screen at will. Only after several goes did I discover that the ship will zoom forward in the direction of the arrow if the fire button is kept depressed.

The paddle dial turns the ship full circle — the secret being to spin and fire as you move forward — just as in Asteroids. But go steady — as once you have chosen a certain course you will have to fire quickly to clear all the aliens out of your way.

Five different types of alien track you around the rectangle in

the centre of the screen which displays your score, the current high score and the number of ships you have left.

Most deadly are the Death Ships which spin around the screen at great speed and can shoot and manoeuvre.

Command ships can also shoot and track you around the rectangle for the most part of the game multiplying in number as the game progresses. Droid ships are slower and easier to kill than Command ships though they will track you with dogged persistance.

Just to make things a little more difficult there are also two types of mines — Photon mines and vapour mines dotted around the screen, which are easy to crash into as you race around the screen chasing a Death Ship.

The game features an invisible force field at the right and left of the screen which, if you are a skilled player, you can use to your advantage — bouncing off it

at full speed and then swivelling to shoot — or to take the corners at full throttle.

Omega Race is practically identical to the arcade game of the same name. Playing the game on your VIC-20 is every bit as good as playing the game in an arcade.

This is a relatively simple game with not particularly inspiring graphics — they are very geometrically similar to Asteroids graphics. But for sheer playability Omega Race is by far the best game I have played on the VIC-20. Nothing else comes close.

Omega Race is the latest addition to Commodore's range of solid state plug in games. Available from VIC dealers at £24.95 inclusive.

● **Getting started** 7
● **Value** 8
● **Playability** 9

Illustrations Jon Davis

HARDCORE

A GAMES PLAYER'S GUIDE TO THE TEXAS T.I. 99/4a

TEXAS — AN AMERICAN FAVOURITE

The Texas Instruments 99/4a is a recently
re-vamped version of the 99/4 which, in
1978, represented the giant American
electronics firm's first venture into the
microcomputer field. Since then the T.I.
99/4a has established itself as one of
America's more popular home com-
puters.

The basic package is a 16-bit (com-
pared to the more common 8-bit) micro-
processor which gives you 16K of RAM
memory expandible up to 48K.

The T.I. is a colour computer with 16
foreground and background colours
although the machine will function ade-
quately on a normal black and white
television.

The keyboard has electric typewriter
style keys — 48 of them — with control

and function keys (user definable), full
upper and lower case capability, alpha
lock, and auto repeat keys.

The computer also has impressive
sound capabilities — five octaves, three
simultaneous tones, plus noise gener-
ator.

It is fairly compact measuring 15 × 10
inches, and 2½ inches high. It weighs
about 5lbs and runs off 240 volts in the
UK.

The machine is now in the shops at
around the £200 mark, the price having
dropped by £100 in the last 12 months. It
seems a fair assumption as well that the
price will continue to fall with rumours of
a drop in price of the VIC-20, the appear-
ance of the Spectrum at £125 and the
continued success of the Atari 400

T.I. EXPANSION

The T.I. has a variety of peripherals avail-
able to enable you to expand the system as
you require — either for home use, or for
commercial applications.

The most simple expansion to your T.I. is
to purchase some leads and plug in your
cassette recorder — this enables you to
store your own programs, or to purchase
pre-recorded cassettes that are
available.

The Peripheral Expansion System is a
show-box shaped unit in brushed alumi-
nium with eight slots for peripheral board-
type cards, one of which connects the
system to the computer console. You sim-
ply plug in the required function card, for
example Extended Basic, Mailing List, or
one of the other cartridges. The system will
also enable you to use one disc drive
within the enclosure. This costs £190.

The T.I. Disk Memory System enables
you to save or load Basic programs for
later use. It incorporates a disc controller
and up to three disc drive units. The discs
are single sided, single density, 5¼" mini-
floppy diskettes each storing up to 90,000
bytes of information. The T.I. DMS costs
£240.

A 400 word vocabulary is built into the
T.I. Solid State Speech Synthesizer. The
words are individually stored on chips and
are reproduced electronically through a
loudspeaker. The synthesizer is useful for
reciting instructions, enhancing games and
educational programs. As might be ex-
pected from a machine from Texas it
speaks with a pronounced U.S. accent. The
Speech Synthesizer is available at £99.00.

T.I. also manufacture an Interface Card
which enables you to connect a wide
range of computer accessories to your

basic console — some of which are manu-
factured by Texas, but the Interface Card
enables you to use accessories from other
manufacturers as well. The Interface Card
is a communications link which enables
you to exchange and receive data over the
telephone line with other computers. It is
available at £130.

The T.I. printer plugs in directly to the
computer console and does not require an
Interface Card. It prints data in a 32 col-
umn, 5 × 7 dot matrix characters at a
speed of 30 characters per second. The
machine has 32 graphic symbols (pre-
defined) and can be used to print — printing
on thermally sensitive paper.

T.I. manufacture a set of Wired Remote
Controllers — joysticks, which plug into the

Magnus Pike tries out the T.I. 99/4a during a
recent Texas press conference

A GAMES PLAYER'S GUIDE TO THE TEXAS T.I. 99/4a

back of the computer console. They are made of hard black plastic with the fire button mounted above the lever. Available from T.I. dealers at £24.00.

All prices are recommended by T.I. — but you would be well advised to shop around as prices vary from one retailer to another.

SPRITELY BASIC

The TI 99/4a runs under T.I. Basic when no solid state cartridges are plugged into the software port. The main difference from Microsoft is that T.I. Basic does not have the PEEK and POKE functions, familiar to most other microcomputer users.

An Extended Basic is produced by T.I. which plugs into the software port on the front of the console. Extended Basic has all the features of Basic with an additional 40 commands and sub programs. Extended Basic also has "Sprites" or programmable moving characters.

T.I. Logo is an educational language designed mainly with young children in mind. It uses an easy to understand set of commands and instructions within computer illustrated exercise. It requires the expansion system, disc drives, and will be aimed mainly at the primary school market.

UCSD-Pascal is an advanced language for the more experienced programmer. You will need the 32K Byte RAM-expansion and the T.I. Disc Memory System.

The software package contains the Pascal compiler to translate Pascal programs into P-code, an editor, filer and utilities package for screen editing and file management and an Assembler linker package for developing TMS 9900 Assembly Language programs.

The P-code compiler enables you to run programs which have been written for other computers on your T.I.

TMS 9900 Editor/Assembler assists the computer by giving the user direct access to all system features, such as speech, sound and the graphics and misc access. This language allows the fastest possible speed to be obtained from the micro computer's 16-bit microprocessor.

CLUB TOGETHER

TIHome is the TI 99/4a users' club. It was set up a year ago by keen hobbyist Paul Dicks and is run independently of TI. The annual membership fee is £9.95 for which members receive a news letter every two months, have access to a software library, and can benefit from TIHome's connections with the American 99/4 Users Association.

The club now has over 500 members. If you would like to join the club write to Paul Dicks at 157 Bishopsford Road, Morden, Surrey, SM4 6BH.

QUALITY GAMES

The availability, range and quality of software has been one of the chief criticisms levelled at the T.I. 99/4a since its launch in the UK.

Since then T.I. have been working hard to improve this state of affairs. In particular, they will be publishing a software review with names and addresses of all the independent software writers known to T.I. This is to be available in September 1982.

Other plans for improving the availability of software include a scheme whereby individual companies purchase patented T.I. cartridges and then write their own programs on them, which they can sell independently of T.I.

Texas is tight-lipped about which companies have taken up the offer so far, although it is known that Thorn EMI's computer wing has accepted the offer and will be producing software — mainly games — for the T.I. 99/4a.

T.I. manufactures some six hundred software packages itself. There are a number of business cassettes, some interesting educational packages, and a wide range of games including some of the old favourites such as Space Invaders and Pacman. The quality of the graphics on some of these games is of the traditional high standard associated with solid state ROM cartridges. It has to be said however, that these are not cheap, Space Invaders, for example, costs £40.

Milton Bradley's U.S.A-based toy manufacturer produces a range of five games for the T.I. 99/4a which are imported to the U.K. by T.I. and are available from dealers.

In total there are over 1,000 packages available in the U.S. 'ar the T.I. — on cassette, disc, or cartridge-manufactured by a number of companies. T.I. are negotiating with a number of U.K. importers to bring these packages into the country.

NOW READ ON . . .

An instruction manual is supplied with the T199/4a and is written for the beginner. You will also receive a Users Reference Guide and a Read This First pamphlet which shows you how to set up your home computer.

For the more advanced user, Texas publish Programming Basic with the TI Home Computer. This 300 page book takes you beyond Beginners' Basic. It costs £7.

There is also a bi-monthly American magazine called the 99'er which is written specifically for owners of T.I. home computers. It is now available in the UK from your local T.I. dealer at £2.35 or by subscription at £13.00 for six issues direct from M.P.I., 8 Cambridge House, Cambridge Road, Barking, Essex, IG11 8NT.

Brainware

MIND ROUTINES

Consider the octohedron above with the 8 faces marked a through to H. There are 6 nodes N_1–N_6 and four faces meet at each node.

By using the numbers 1-8 place each number on a face. There are four questions but mostly.

1. Calculate the node values as the sum of the four adjacent sides. What is the maximum product of all 6 nodes

which can be obtained?

2. Using the node values as in 1 what is the minimum product of all 6 nodes which can be achieved?

3. Calculate the node values as the product of the four adjacent sides. What is the maximum sum of all 6 nodes which can be achieved?

4. Using the node values as in 3 what is the minimum sum of all 6 nodes which can be achieved?

You should submit your values for A-H for each of the 4 answers.
Example Suppose we numbered the sides A=1, B=2, etc H=8
Then the node sum $N_1 = 1+2+3+4 = 10$.
And the node product will be $N_1 = 1 \times 2 \times 3 \times 4 = 24$
For all 6 nodes we have

Node	Node Sum	Node Product
1	10	24
2	14	60
3	18	252
4	22	672
5	18	160
6	26	1680

Product of sums = 35945920   2848 = Sum of products

These values lay somewhere between the maximum and minimum results.

NEVER A CROSSWORD

ACROSS

1. Pacman ghosts in edible mode (4,8).
5. Sure me confused. Restart the program (6).
8. Articles on wood provide one kind of computer (6).
12. Times are mixed up (3).
13. Man, high class king, first class warrior (6).
15. /18. across. "T" sights reassembled to join two points on a screen (8,5).
16. G Merlin I thinks it's a kind of Bug (7).
17. Upper class regret concerning surroundings (6).
18. Re-align, losing force becomes confused but ends up straight (6).
20. Stab or end this mixed-up process (6).
21. Match Ali mate adds up (12).

DOWN

2. Lean on a public relations "own goal" to make hard copy of computer game (4,1,4).
3. Take legal action against Barker (3).
4. Continuous read out pound handle of games interface (7,4).

6. Right machine language initially provides educational computer (3).
7. Chieftains converge on former C&VG computer battle ground (10).
9. Young lady states her intention to become crude about bomb H.Q. (7,4).
10. Good player sees G-Man in disorder (5, 5).
11. One Politician on rising ground in Adventure game (3,4).
14. Bulls eye contrary (5,4).
19. Programme: IF this was to be added to the 9'O Clock News . . . (3).
20. Computer Company in scenes one and two (3).

SOFTWARE GLOSSARY

A beginner's guide to plain jargon

ALGORITHM: A process or set of rules to carry out a task or solve a mathematical problem.

ARRAY: A series of items arranged to form a meaningful pattern.

BASIC: The most widespread computer language which is one of the easiest to learn and is used for programming all microcomputers.

BIT: An abbreviation for a binary digit. It represents the smallest unit of information, for example 0 or 1, on or off.

BUG: A slang term given to a mistake in a computer program which prevents it from working. It can refer to a mechanical, electrical, or electronic fault.

BUS: The circuit over which data or power is transmitted.

BYPASS PROCEDURE: Method of getting vital information into a computer if the line control computer fails.

BYTE: A term to measure a number of Bits (Binary digiTS), usually there are eight bits to a byte.

CALCULUS: Alegbraic notation.

COLOR: American spelling used to call colour out of several U.S. computers, e.g. the Apple.

CURSOR: A position indicator used by most computers to show where the next character should be entered.

GET: A Basic command which tells the computer to scan the keyboard and return with either a numeric or string value.

GRAPHICS MODE: A mode in which the computer can produce graphical characters and displays.

HARDWARE: The general term given to all pieces of electronic and mechanical devices which make up a computer system, i.e. the actual machines.

INKEYS: A Basic command which checks the keyboard for input and places it in a string.

INPUT: Data or information which is fed into the computer.

INTEGER: A number which does not contain a decimal point, i.e. a whole number.

INTERFACE CARD: Communications system which enables computer users to transmit data using a variety of communications devices. There are international standards for interfaces RS-232 being perhaps the best known.

K: See kilobyte.

KILOBYTE: A measurement of memory capacity. 1K is equal to 1024 so 8K is equivalent to 8192 bytes.

L.E.D.: (Light Emitting Diode) Provides a simple display and consists of an electron tube which lights up when electricity is passed through it.

LOAD: Instruction which is used in conjunction with a cassette recorder to transfer programs from tape to the computer's memory.

MATRIX: Is an array of numbers in columns and rows — most microcomputers use a dot matrix printing system.

MENU: List of programs, questions, or procedures which are displayed on the screen for selection by the user.

PERIPHERALS: Equipment which is used with a computer system, e.g. printers, disc drives, and VDUs.

PLOT: To map or draw points on the screen.

RAM: (RANDOM ACCESS MEMORY) This is a memory chip which you can load programs and data to and from.

RAMPACK: A cigarette-case sized pack of extra RAM which plugs onto the back of a Sinclair ZX81.

RUN: Basic command word tells the computer to perform the numbered sequence of actions referred to as a program.

SOFTWARE: Another name for computer programs.

SOLID STATE: Refers to components made up of solid materials as opposed to the now defunct vacuum and gas tubes that you used to see in old television sets. Microcomputers have solid state circuitry.

STAR TREK: A popular computer game based on the TV series of the same name, in which the player takes command of the Starship Enterprise and roams the galaxy, destroying Klingons and investigating solar systems.

STATEMENT: An instruction in a computer program.

STRATEGY GAME: A game in which you must carefully plan your moves taking into consideration the likely counter moves of your opponent.

STRING: Usually represented by $ sign on the computer keyboard, a string is a connected sequence of characters or words, usually placed within PRINT statements.

Kit Korner

POWER AND THE MICRO

Single rail power supplies, i.e. those with only one voltage output, which is usually all that is needed for most of the most common machines, are quite easy to build, so long as you go about it in a sensible manner. I will give you a few ideas to work on and some useful precautions to take. It is of the utmost importance that the output is fully protected and fail-safe as a power surge on the board is fatal to the chips.

Power supplies have become far simpler by the introduction of voltage regulator I.C.s. These chips come in different voltages and current ratings, depending on your requirements. Most are fully protected from over voltage, short current and over heating. Basically all they need as an input is a DC voltage a couple of volts above that of the output.

There are, however, a few external components which are recommended for safe use. These are usually bypass capacitors and are generally available in your local components' shop, along with the rest of the bits and pieces.

Below, I have outlined a simple power supply with a transformer, a bridge rectifier comprising 4 diodes, a smoothing capacitor and the regulator unit, including capacitors. This arrangement would be quite adequate in its present form to cope with most applications. It would, however, be advisable to add a few extra safety components.

Going from left to right we first come across the transformer. Most these days have two separate primary windings so that they can be used with both 120 or 240 volt mains supplies. They must, of course, be

wired for 240 volts in this country. The first extra component is a mains voltage dependent resistor or transient suppressor. These items are wired between the live and neutral of the mains. They act normally as an open circuit, until a higher than usual voltage is applied when they go short circuit. Make sure that your mains fuse is light enough to protect the mains cable from over heating, if the high voltage is maintained.

Also, make sure that the transformer, and all other components for that matter are able to supply or carry the current which you require. If you are aiming to achieve 5 volts at the output a 6-0-6 transformer will be sufficient if the secondary coils are connected in parallel.

From the diagram that would mean connecting pin 1 to 3 and 2 to 4 and taking the pairs to opposite sides of the bridge rectifier. Once smoothed the 6 volts a.c. will become approximately 8 volts, this being sufficient to feed to the regulator.

Depending on the current capacity of the regulator you are advised to get a transformer which will supply twice that required at the

output. This will ensure that the transformer does not misbehave itself by giving out little spikes.
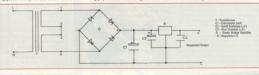
Transient suppressors could also be used before the diode bridge, although this is not absolutely necessary. Diode bridges can be obtained for different current ratings and you should aim to fit one which can cope with more than you require. This will keep the operating temperature well down.

To smooth the AC you will require a large electrolytic capacitor in the millifarad (thousands of microfarads) range depending on the current drain. Each capacitor is graded in capacity, voltage and ripple current. It is advisable to over estimate the last two by, say, a quarter.

Remember that the voltage specified will be the output from the bridge and not the regulator, so for a 5 volt regulator with 8 volt input a 10 volt electrolytic would be sufficient, although 16 volts will be better.

There should be with the regulator a specification sheet indicating the type and value of the required capacitors. Usually, though, a solid tantalum is used on the input with a disc ceramic on the output to suppress little spikes from the regulator. Without going overboard with protection this is all that you will need for a perfectly workable power supply. I would recommend that the unit is built up on one of the stripboards, taking care not to heat up the tracks too much.

This technique of building power supplies can be used to produce multiple rail versions for some of the more advanced machines if required. Enough has been written on power supply for you to go away and design your own power station, so be adventurous and save yourself some pennies.


```
T - Transformer
C1 - Electrolytic (mf)
C2 - Solid Tantalum (μF)
C3 - Disc Ceramic
D - Diode Bridge Rectifier
R - Regulator I.C.
```

Regulated Output

BY KEITH MOTT

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